THE ATHENÆUM

Journal of English and Foreign Literature, Science, and the Fine Arts.

No. 677. LONDON, SATURDAY, OCTOBER 17, 1840. PRICE FOURPENCE; (Stamped Edition, 5d.)

For the convenience of Subscribers in remote places, the weekly numbers are reissued in Monthly Parts, stitched in a wrapper, and forwarded with the Magazines.—Subscriptions for the Stamped Edition for the Continent, for not less than 3 Months, and in advance, are received by M. BAUDRY, 9, Rue du Coq-St.-Honoré, Paris, or at the Athenæum Office, London. For France, and other Countries not requiring postage to be paid in London, 28 fr. or 11. 2s. the year. To other countries, the postage in addition. [JAMES HOLMES, TOOK'S COURT.]

EDINBURGH REVIEW, No. 145, is published this day. *Contents:*—

1. De Tocqueville on Democracy in America.
2. Correspondence of the late W. Wilberforce, M.P.
3. The British Pulpit.
4. Goethe's Theory of Colours, by Eastlake.
5. Biblical Criticism.
6. Von Raumer and others on Italy.
7. Sir T. F. Buxton on the Slave Trade and its Remedies.
8. Hallam's History of Literature.
9. Ranke's History of the Papacy.—Ranke's History of the Popes.

London: Longman, Orme, & Co. Edinburgh: A. & C. Black.

LONDON, SATURDAY, OCTOBER 17, 1840.

REVIEWS

Geography of Edrisi. Translated by P. A. Jaubert. Paris.

We are happy to announce the completion of this work, the undertaking of which is highly creditable to the zeal and discernment of the Geographical Society of Paris. When the first part was published, four years ago, the work appeared to us so exclusively calculated for a particular class of scholars, and to have so little of popular interest, as not to call for any notice in the pages of a journal which is meant for all. But we feel compelled to abandon our opinion, and to break silence in favour of the part just published, and of the geographical description of the British Isles contained therein—a specimen too curious to be passed over without comment. Abu Abd Allah Mohammed ben Mohammed el Edrisi composed his geographical work, entitled 'The Recreations of a Man who desires a complete knowledge of the different countries of the world,' about the year 1152, at the court of his patron, Roger, King of Sicily. It is often quoted by Arab writers as 'The Book of Roger.' This Sicilian prince, on whom el Edrisi showers the epithets of praise with true oriental profusion, was partial to geographical studies, and having endeavoured in vain to satisfy his curiosity from books, he drew together the best informed travellers, and sought, by systematic interrogatories, to acquire from them an intimate knowledge of the countries which they had visited. His inquiries in this way were continued fifteen years. To fix their results he adopted the measures which el Edrisi thus describes:—

He then wished to know, in a positive manner, the longitudes and latitudes of places, and the respective distances of the points regarding which the above-mentioned travellers were agreed. For this purpose he had a drawing board prepared; and he had traced on it, one by one, by means of a pair of iron compasses, the points mentioned in the works consulted; and those of which the position seemed to be sufficiently ascertained by the general accordance of opinions respecting them. He next ordered a planisphere to be cast, of silver, pure, and without alloy, of enormous size, and weighing four hundred and fifty Roman pounds. On that he had engraved, by able workmen, the configuration of the seven climates, with that of the regions, countries, tracts remote from or near the sea, branches of the sea, lakes and streams of water; also the indication of deserts and of cultivated countries, their respective distances by the frequented roads, either in standard miles or other known measures, and the names of ports. And he enjoined the workmen to adhere strictly to the model traced on the drawing board, without departing in any manner from the configuration thereon delineated. And for the perfect understanding of this planisphere he caused a book to be written, containing a complete description of towns and territories, of the nature of their cultivation, and of their habitations, of the extent of the seas, of mountains, rivers, and plains. This book was also to treat of the kinds of grain, fruits, and plants produced in each country; of the properties of those plants; of the arts and manufactures in which the inhabitants excel; of their commerce, importation, and exportation; of the curious and remarkable objects found in the seven climates; of the state of the various populations; their external forms, their manners, customs, religion, dress and language.

Such is our author's account of the scope and design of his work, and of the resources which he possessed for the composition of it. An abridgment of his great work, translated into Latin and published in 1619, under the erroneous title of 'The Nubian Geographer,' has been much esteemed by the learned, whose curiosity it served to stimulate respecting the complete geographical treatise now laid before them by M. Jaubert, to whose diligence and ability all who are attached to geographical studies must feel under deep obligations. Although el Edrisi does not appear to have been more critical and independent in his judgment than Arab writers in general, and though in his account of the interior of Africa—that part of his work which has been oftenest quoted and the most ably annotated—it is easy to detect numerous misconceptions and theoretical deductions usurping the place of facts, his work, nevertheless, is not only a remarkable monument of the twelfth century, but it is also extremely valuable as a rich depository of information. From Sofala to Norway, from the British Isles to China, the whole of the Old World, so far as it was then known, is described by him with a variety and abundance of details, which are truly surprising, and which prove that commercial enterprise and the spirit of inquiry were never quite extinct, even in Northern Europe, during what are commonly called the dark ages. It was from Italian merchants and seamen, probably, that our Arab author obtained his information respecting the north-west of Europe. After representing, in faithful language, the wet and foggy climate of Brittany, and stating that the people are rude, ignorant, and improvident, he thus proceeds to describe the waters of the channel, the turbulence of which was fully recognized, it appears, in those days:—

The waters of this sea are thick, and of a dark colour; the billows rise in it to a fearful height; its depth is immense; darkness reigns there for ever; the navigation is difficult; the winds violent, and towards the west the limits are unknown. There exist in this sea many inhabited islands. Few navigators dare to venture into it; and those who do so, although they have the requisite knowledge, as well as boldness, navigate only from coast to coast, and without quitting the shore; besides, the favourable time for these voyages is limited to the months of August and September. The chief navigators of those seas are known by the name of Ingilsin (English), or inhabitants of Ingilterra, a large island, containing many cities, inhabited places, fertile fields, and rivers. Notwithstanding the formidable character of that sea, and the magnitude of its waves, it contains plenty of excellent fish, and fisheries are carried on at certain places. There are also marine animals of so enormous a size that the inhabitants of the remoter islands employ their bones instead of wood in the construction of their houses. They also make of them clubs, javelins, daggers, stools, ladders, and in general, whatever is elsewhere made of wood.

The thickness of the northern seas, in this passage, is a stroke of erudition, the idea being borrowed from the writers of antiquity. The terms in which the excellent fisheries are mentioned, and the allusion to the uses made of the bones of the whale and walrus, show that the northern islands were at that time known to the Italians, and suggest that in the twelfth century the trade already existed, which gave the indeterminate island of Stocafixa (Stockfish) so conspicuous a place in all the early Italian charts. But to proceed to the islands of the Dark Ocean: "The largest of these," says el Edrisi, "is Yerlanda," [and not Berlanda, as M. Jaubert reads the Arabic name, which is deficient in a point,] "which is three days and a half sail from Brittany, and two days from the desert isle of Scosia (Scotland)."

"Yet," he adds, "the author of the Book of Wonders relates, that there formerly existed in the latter island (Scotland) three cities; that the island was inhabited; that ships went thither and cast anchor, to buy from the inhabitants amber and beautifully coloured stones; but that some of the natives attempting to subdue the rest, civil wars ensued, with rapine and devastation, till at last the inhabitants emigrated to the continent, and their cities went to ruin."

Of England he goes on to tell us that it is—

A considerable island, having the shape of an ostrich's head, and containing flourishing cities, high mountains, great rivers and plains. The country is fertile; the people are brave, active and enterprising: but perpetual winter reigns there. The town which is nearest to the continent (namely, to the land of France) is Wádi Sant, and the width of the strait is twelve miles.

M. Jaubert supposes Wádi Sant to mean Wissant and makes it, in his translation, belong to France, which is manifestly absurd. The words "of the land of France" (or Flanders, for it seems to us doubtful which is meant,) have reference to "the continent," and not to the name of the town. What place then are we to understand by Wádi Sant? The Arabic word Wádi signifies a river or a valley; an inlet, or any hollow, in short, marking the course of a river. Now, in this instance, and we suspect in others also, our author, or rather his Italian informant, seems to have ventured on decompounding the English, and thus he has made Wádi Sant of Sandgate, which stands, as he says, in the narrowest part of the channel. He thus proceeds:

Among the cities of England situate at the western extremity, and in the narrowest part of the island, must be reckoned Sansahnar, twelve miles from the sea. It is handsome and prosperous, and stands on the banks of a great river which comes from the north, and enters the sea eastward from the town. Thence to Gharham (Wareham), along the shore, is a distance of sixty miles.

Sansahnar, according to M. Jaubert, is Chichester, which place, nevertheless, does not in any manner answer our author's description. It is manifest that the pointing of the original text is defective, and that for Sansahnar we ought to read Satsahtar, by which name we are probably to understand Exeter. This supposition will relieve us from some, but certainly not from all, the difficulties presented by our author's statements. Thus, he says, that Salaberis (Salisbury) is a handsome town, sixty miles northward from Sansahnar, and on the eastern bank of the river which falls into the sea near the latter place. Twenty-five miles (eastward) from Wareham he places Cape Haïouna, on which, he says, stood a flourishing town, near which, on the east, the river of Ghounester, or rather Guinseter (Winchester), entered the sea. We cannot understand how M. Jaubert can justify his identifying Corfe Castle with Haïouna. We rather expect to find this place—some latitude of conjecture being allowed in compensation for the uncertainty of the original text—in the Tweon-ea of the Saxons; the Thuinam of Domesday book; the Twyneham of the present day, or, as it is more commonly called, Christschurch:—

From Haïouna to Shoreham, continues our author, is sixty miles. This last named town, standing on the sea-shore, is handsome, and well peopled. It has ship builders' yards, and public edifices. Then fifty miles to Hastings, a large and populous town, with numerous buildings, markets, industry, and a rich trade. Seventy miles further east is Dobres (Dover), a town of equal importance, and standing at the entrance of the strait that separates England from the continent. Forty miles from Dover to Londres (London), a town in the interior, standing on a river which falls into the sea between Dover and Djartmouda.

The last-named place was, according to our author, "a pretty town on the sea-side." We cannot assent, therefore, to M. Jaubert's conjecture, that by Djartmouda is meant Nordmuth, the ancient name of the Nore. It is manifest that the original text ought to be read Jernmúd, the Yarmouth of the present day, and a place of great importance in the twelfth century:—

The river of London (continues el Edrisi,) bears the name of Rothálda. It is large and rapid. It rises in the centre of the isle, and fifty miles from

its source flows by Gharcafort (Wallingford), whence it passes on to London and to the sea.

When the Italian merchant, to whom our author owed his information respecting England, ascended the Thames, it is manifest that he took his berth in the pool at Rotherhithe, and gave this local name to the whole river. It deserves to be remarked, that our Arab author systematically employed the guttural letter ghrain (here represented by gh) for the combination gu, which the Italians make use of to express the w. Thus we find Wareham, Winchester, and Wallingford respectively written, Ghárham, Ghúnseter, and Gharcafort. When, therefore, he says that ninety miles from Jartmúd (Yarmouth) and ten miles from the sea is Barghík, it is manifest that this word must be intended to represent Barwik, or rather, by changing a point in the original, Narwik; and since it can hardly be Norwich, it may have been a town at the junction of the Nar and Ouse, a little above the modern Lynn Regis. Our author observes, that beyond Yarmouth the sea forms a gulph facing the north, which description exactly answers the bay called the Wash. From Barghik, or as we prefer it, Narghik, eighty miles conducted to the sea port Aghrimes, or rather Ghrimes, for the initial vowel is obviously used only for the sake of permitting the two following consonants to be joined, agreeably to the analogies of the Arabic language. M. Jaubert assumes Aghrimes to be Lynn Regis, and Barghik to be Ipswich. But we, while we convert the latter into Narwik, and place it a little above Lynn Regis, fix Ghrimes at Great Grimsby. Further on, at the distance of another eighty miles, was Afardík, supposed by M. Jaubert to be Berwick, but to us it appears necessary to read the name Frod-dike, and from its termination we should be disposed to seek the place so called in the Humber. It is true that we are told that it was near Scotland, but, nevertheless, we find that the road to Durhalma (Durham) went northward from it, and that it was only ninety miles from Nicola or Nicolis (Lincoln). Here terminates el Edrisi's account of England, in which there is little mention made of London and none of Bristol; the ports mentioned by him being those only in the channel and the German ocean, where Yarmouth and Grimsby had, at that time, the chief commerce with the Northmen, and carried on extensive fisheries.

The preceding description of the British Isles, meagre as it is, yet suffices to show, that already, in the twelfth century, the English had the character of being hardy seamen and enterprising merchants. It affords us, also, a point of comparison between the measures of prosperity in that age and in the present. Shoreham and Hastings, with their shallow and insecure harbours, then held the important position which now belongs to Liverpool and Glasgow—to Portsmouth and to Plymouth. The dubious reading of proper names in Arabic manuscripts, is a serious annoyance to the student, and one which an editor ought to do his utmost to remove. It is, therefore, to be regretted that M. Jaubert did not find means to collate his copy of el Edrisi, which appears to be a very faulty one, with the two manuscripts of that author in the Bodleian library. A little commentary or explanation, also, would have been extremely acceptable to the bulk of readers, who are unacquainted with the peculiar systematic ideas of the Arab geographers.

Bell's Journal of a Residence in Circassia. A Year among the Circassians. By J. A. Longworth. [Second Notice.]

We shall now proceed, according to promise, to select some few sketches of manners and domestic life among the Circassians—a people whose isolated position, and peculiar institutions and prejudices, have left them comparatively untouched by modern civilization: a people, though not nomadic, among whom even property in land is almost unknown; whose title-deeds are enclosures, which, once obliterated, leave the land again common. "The Circassians," says Mr. Longworth, "cannot see how, except for immediate use, anybody can claim an exclusive right to the soil; with them all the elements are in common, earth as well as air, fire as well as water, since fuel may be had in any quantity for the cutting. Property here consists in the hands employed in cultivation, cattle, and produce already realized. Their ideas with respect to it apparently indicate a nomadic origin. It is true they have houses instead of tents, but they are of the simplest and most uniform construction, mere cages of wickerwork plastered with clay, the same in pattern and materials that have been used for ages; a proof, if the fact required one, that their inmates are seldom long together stationary, as in that case they would be susceptible of improvement." To every house is attached a guest-house, where strangers are received and entertained, and where the host, whatever may be his rank or fortune, must attend on them. But as traits of character will most pleasantly develope themselves in our extracts, we shall proceed at once to selection. We cannot commence more naturally than with breakfast:—

"In a walk (says Mr. Bell) over one of the hills this morning, I saw abundance of hazels, bramble berries wild rose, scented hawthorn just flowering, and deep beds of fern; nothing in short that struck me as differing essentially from the clothing of our own mountains, excepting the luxuriance of the vegetation. The climate is said to have neither heat nor cold in extremes. The dogs at the farm-houses appear to be of the very same breed as those of our hills, and they are equally inhospitable; but their masters do not participate in their surliness, for a peasant at one of these houses, where I asked my way, brought me back the greater part of it. It was well I had a good walk, for on my return I found a kid had been killed, which helped to furnish a genuine mountain-breakfast, the detail of which I shall give as a specimen of the abundance here; for I am with a family which, as I said, is considered to be but in moderate circumstances. First, sweet cake and milk were served; then, on a clean wooden four-footed tray, a great mess of thick pasta, with a wooden bowl stuck in the midst, filled with a sauce of milk, walnut-oil, and capsicums; and around the pasta on the tray (for there are no plates) was arranged pieces of the boiled kid, from which one of the sons helped me to the tit-bits. Next came a large bowl of grape-syrup and water, which was handed me as a specific for the digestion of fat meat; then succeeded a bowl of milk with pasta mixed in it; and I was already more than breakfasted, when there was served a large bowl of excellent kid-broth, thickened with beans, &c., of which also I was obliged to taste. After me breakfasted a Turkish stranger and my servant; after them the father of the family, who, before he began, handed two large pieces of the kid to his Russian serf, and then the sons took the remains to their own house to breakfast there."

Mr. Longworth next tempts us by a dinner invitation:—

"Our Konag Bey stood ready to receive me, and leading my horse opposite to the guest-house, assisted me to alight. He then ushered me into the house, and with his own hands relieved me of my arms, and hung them against the wall. A silken couch had been spread for me in a corner of the room, on one side of the hearth; at the head of this was a pile of cushions: with the exception of these, and a mat and cushion laid down for the Hadji, there was no other furniture in the room; but the walls, gleaming with the weapons of the guests, presented anything but a naked appearance. For some time, everybody remained standing but myself; after a short silence, the words of welcome were exchanged, when another pause took place. Our host then desired the principal guests to sit down, but at first on no account would he be seated himself; after repeated pressing, however, he crouched himself down at a respectful distance on the floor. I have been thus minute in detailing these ceremonies, as they mark the reception of a stranger in every house in Circassia. The room itself was of an oblong shape, eight yards by four; the walls were constructed of stakes and hurdles, plastered on each side with a coat of light-coloured earth; the floor was of hard earth, which I observed was every now and then carefully watered and swept. The thatch above, supported by rafters in a triangular form, descended from the roof over the walls in large projecting eaves, serving in summer for verandahs. Extending from the walls almost to the middle of the room in a semi-circle of about two yards in diameter, and at three or four feet from the ground, was a huge chimney: it contracted itself towards the top in the shape of a bell, and perforating it at the gable, rose a few feet above the roof. So spacious are these chimneys, that there is hardly one of them without a swallow's nest, where, unmolested by the fire beneath, they enliven the apartment by their constant twittering. They are made of the same materials as the walls; indeed, all manner of building, is of basket-work. * * After we had been some time seated, a large bowl of a beverage the Tartars call *boza* (in Circassian, souat) was presented to me by my host; it is a mixture of fermented millet seed and honey, 'thick and slab,' and exceedingly nauseous I thought, though drinking it out of complaisance to my entertainer, who watched me closely, to see that I did not flinch, and during the evening renewed the charge, bowl in hand, at least a dozen times. Dinner, or, more properly speaking, supper, which constitutes their chief meal, was served after sunset. It consisted of a series of dishes, removed one after the other, on round, three-legged tables, about the size of a joint-stool. A sheep having been slaughtered for us, the mutton was served on a thick layer of millet-cake, instead of a dish; being moist and soft, it is easily moulded into the requisite form—that is, with a deep trench in the centre, containing the sauce, or condiment, defended by a circular mound, itself invested on the outside by substantial pieces of mutton or beef. The Hadji and myself commenced the attack on these fortifications, having been provided for the purpose with small knives by the Circassians, who, by-the-bye, always wear these, in addition to their daggers, in their girdles. The latter are never used at meals, the former being for the double purpose of carving their victuals and shaving their polls. After meat came the broth, served up in a wooden bowl, or rather a reservoir, of formidable dimensions; its surface frozen over like the Arctic Ocean, not with ice, however, but grease; but by inserting, in imitation of my Hadji, the spoon, with a dexterous jerk into the liquid below, I found I could convey it to my mouth in a tolerable state of purity. The ensuing courses were, for the most part, composed of pastry, *caimac*, or cream, cheese-cakes, forced meat in vine leaves, and finally a large bowl of yoghort, or curdled milk, which last, like the pilaff in Turkey, invariably crowns the repast. I was at first surprised to see no vegetables on the table, but I afterwards learned that, although abounding in the country in every variety, the Circassians seldom or never eat them. A native of this country dining with Scodra Pasha, in Albania, and declining to eat the vegetables which the Turks, odd to say, are as fond of as the Circassians are averse to them, and which, in successive dishes, formed, on this occasion, the staple of the dinner, was pressed repeatedly by the latter to partake of them. He at length told the Pasha, with much *naïveté*, that none but beasts dine on greens in Circassia. During the course of our meal, observing that the Hadji handed to the by-standers and assistants lumps of meat and pieces of pastry, in compliance with the custom, I showed myself, at the expense of my host, equally generous. On receiving these scraps, the favoured individual retired with great modesty into a corner, and, turning his back to the company, devoured them in secret. As every table was removed, it was taken to our servants, and after they had been satisfied, passed to a crowd of hungry expectants out of doors."

But we must sup with Mr. Bell, and thus conclude a day among the Circassians:—

"After politics had been discussed we all adjourned into the park to see the paces and points of the Georgian steed, and to try my telescopes. Mats were provided for those who wished to say their prayers. We had a horse-race too; gained by a son of my host—a beautiful and gentle boy of twelve years. This young nobleman and I have become great friends, yet I could not succeed in inducing him to be seated on the divan beside me, even in the absence of company, so habitual is the respect for strangers and seniority! * * After sunset and prayers, we had some meat and pasta. Just as the conversation grew languid, and we were dozing round the embers of a great wood fire, my attention was roused by something like music from the distant and shaded extremity of the room. It was the singing of a boy about four years old, accompanied by that of the man between whose knees he stood. What the words of the song were I knew not, but they soon roused all the rest of our large party and produced among it much laughter. To this succeeded a singular, yet very exciting quartett of men's voices. It was at times a sort of fugue, but I never heard anything resembling it, especially the occasional bass accompaniment. The copyright would be valuable in England, yet merely as a musical curiosity, for it was but as the wailing of infant music, though the subject was the deeds of men—a battle fought lately against the Russians.—When the performance was finished, another, much longer, and more extraordinary, was begun by a tall, lank, hare-brained-looking personage (our host's brother-in-law), who had sat dozing and roasting close by the fire. He sang, in a falsetto voice, a very rapid recitation, and every few minutes three or four others, who sat behind in the shade, contributed a few fine tenor and bass notes, like the swell and fall of an organ. This long recitation recounted the charms of an extraordinary beauty of the Zaziokû family, and the numerous suitors she had rejected. It is in great vogue, although the heroine is now married.—Thus passed our evening, till about half-past ten o'clock, when a plentiful supper was served, with abundance of wine (or brandy, for those whose *religious* scruples made them prefer it), and about midnight, mats and bedding were brought in and laid on the floor for Hassan Bey and some eight or ten other chiefs, while they insisted on my retaining the whole of the divan. No titles are used here in conversation: even dependents address their chiefs by what we call their christian names, and, as I have shown, occasionally eat with their sons; yet perfect respect is never wanting. Invariably when a chief, or even small proprietor, enters a room, every one makes a movement of rising. If elderly, they rise entirely, and remain erect till he be seated."

On another occasion, he observes—

"After supper—which we discussed amid a great gathering of servitors and spectators—I began to think how the remainder of the evening was to be got through, and was pleased to see a circle formed, preparatory for some amusement. First, there was a measured clapping of hands; then succeeded a few low notes, which gradually swelled into a lively tune, joined in by most of those standing around; and at length one of the wildest-looking of the 'ghillies'—with a long, tattered great-coat, *à l'Irlandaise*—took courage, and starting into the open space beside the fires, began dancing. Louder singing and clapping of hands, mingled with shouts and screams, soon excited him to such vigorous activity as must have pleased even 'Tam o' Shanter.' Many of the steps were tolerable; but the chief feat was springing on the very points of the toes, and spinning round with great velocity. At the end of one of these pirouettes, the dancer fell flat on the grass, and, with a strange ventriloquial sound, vented moans of complaint, as if he had half killed himself. His very clever buffoonery which followed I need not attempt to describe, because I have no doubt that his impromptus, which I did not understand, but which raised shouts of laughter from all around, formed the best part of it. Yet his imitations of a cat, a cur, &c., were excellent in their way; and he enjoyed the usual privilege of buffoons, as he approached the booths and addressed the nobles in speeches that excited much mirth, which he further increased by giving Ali, whose serf he is, two or three sound whacks over the shoulders with a stick. My Herculean friend received them in the spirit of fun in which they were bestowed by the actor."

We gave last week an account of a wedding feast: here is one of a funeral. In this instance the person mourned had been killed in a Russian foray:—

"When, as in this case, the body is not forthcoming, a cushion is placed on a mat at the side of a room; upon and around it are the clothes of the deceased; and, on the wall immediately above, are suspended his arms. The room is filled with the females, and the female relatives and friends of the family, seated: and, at the door, stands the widow erect. At each side of the cushion are seated the daughters or some young female relatives. On the green before the door the men assemble. One of them approaches the door, uttering a wailing cry, which is responded to by the females inside, who rise while he enters softly with his hands over his eyes, and kneels before the cushion, placing his forehead upon it. The young girls on each side assist him to rise, and he retires. The rest follow, one by one, until the whole have performed this ceremony; but the old men generally, instead of uttering the lament, speak some short sentence of consolation or endurance, such as, 'it is the will of God.' This larger assemblage of men and women lasts for three days; but the females of the family and its immediate relatives must be in attendance to receive mourners in this manner for a fortnight; and the clothes and other relics of the deceased remain as described until the greater funeral repast, which is given either six months after, or on the anniversary of the death. The very poorest never omit this entertainment; but the rich give other repasts at intervals of a week, a fortnight, and forty days after the death. If the clothes of the deceased were not good at his death, new are made, and the relatives contribute different articles, such as shoes, leggings, leather drinking-cups (for travelling), &c., which are laid with the rest of the things on the mat, and are subsequently distributed to the priest of the neighbourhood and those who assisted at the ceremonies. The family can retain nothing except the arms which the deceased bore and the horse he rode, which, out of respect to his memory, is kept six months in the stable and well fed during that time. When one has died a natural death at home, his body is immediately washed, enveloped in new white cotton or linen cloth, and buried within three or four *hours*, the immediate neighbours assisting in the first portion of the lamentation. If he was killed in battle (that is a *bond fide* battle, not a mere excursion for booty; for a decided line of distinction is drawn), he is interred in the clothes he was killed in and without washing; it being supposed that in this state he will be at once received into paradise, as having fallen in defence of his country; but if he survive his wound some days, he is presumed to have again sinned (perhaps in regretting his wound, or expressing impatience under it), and must, therefore, be washed and dressed for his immortal journey. The same ceremonies are performed at the death of women and children, but the assemblages are less numerous."

We shall now give some account of the country, and of country life. The following, from Mr. Bell's journals, is a pleasing picture:—

"I find no greater relief from the dejection and ennui which occasionally visit me, than in thus sauntering down our valley to take my accustomed seat on one of the hills that overhang the beach, where I have a view of the ocean; the picturesque capes of the widely-stretched coast; our lovely valley with the mingling lines of wooded hills rising gradually in altitude toward the precipitous and lofty mountains that form the barrier on the east; or to refresh my spirit by taking a station near some happy band of our neighbours—old and young, males and females—busily engaged in weeding their crops with the hoe or hand, and singing together some lively air to lighten the labour, which they sometimes intermit to come around me, offering some of the refreshments they generally have with them; a light for my pipe, or to joke a little. Thus they aid each other alternately, and their crops in general have the cleanly appearance of one of our nursery-grounds. If a traveller pass while this or any other agricultural occupation is going forward, he almost invariably cries out 'Rabestûakho' (May it be productive!); and the rules of good breeding equally require, that when he encounters a flock of sheep or goats, he should not press on; but wait until the shepherd have gathered them to one side or other of the pathway, when he exclaims to him 'Bowhapshi' (May you have increase!)." * *

"Our road lay right across the hills which form the east side of this valley; we found their eastern declivity very steep, and thickly clad with forest-trees. Emerging from these, we reached a winding upland valley, through which runs the small lively stream Haberdah, along whose banks were fields of exceedingly rich vegetation, interspersed with clumps of trees of large growth. There were frequent indications of partial inclosure at a former period, but there was little grain, and few habitations were to be seen."

"Immediately on entering the valley of the Nebejeh, we descried numerous hamlets, not a gun-shot from each other, interspersed with rich corn and hay fields (well inclosed, and with gates on the cross roads), which continued till the valley terminates in a large and very oblong plain called Tejaghuz, almost the whole of which is devoted to pasture, while the low hills that enclose it, and which continue diminishing in elevation as they approach the plain of the Kûban, are covered with hamlets, corn-fields, and woods. It was now the middle of hay harvest, and many parties were actively at work. The grain harvest too had begun in some places."

"We were taken into a neighbouring wood to see an oak celebrated for its size and antiquity. It took eight men's arms, full stretched, to gird it, at the height of their arms above the ground; and it is from sixty to seventy feet high, yet is it still 'green and flourishing.' * * On returning from this walk, I observed a large field of barley quite ripe, which three little boys were cutting, while a dozen of young men, near at hand, were amusing themselves at catching each other (perhaps exercise in prisoner-taking), leap-frog, rope-skipping, &c. Harvest work would, I presume, from this and similar instances, be esteemed degrading to warriors."

"On our way I was again vexed to see so little done to reap the immense quantity of ripe-corn we passed. In one field I saw a single old woman at work; and, in another, three old men. Not so however with the hay harvest; for, in passing the lesser valley, we saw a large assemblage of males and females on a hill side; and our escort, knowing its nature, immediately called a halt and sent an embassy to the hill side. We seated ourselves meantime beside a stream; and presently a large body of men with scythes over their shoulders descended and marched past us; then a bevy of damsels tripped shyly by, with flowing robes and gay silver head and breast ornaments; and lastly came some men bearing bozè and cakes, the objects of the halt. The mowers proceeded to an adjoining field, whence we heard the whole of them begin singing, at the full pitch of their lungs, one of their lively national airs; and in passing we found them keeping time with the sweep of their scythes; while the young ladies were grouped under a tree in the middle of a field, their presence no doubt inciting the mowers to greater activity."

Bees may be considered as among the farm stock. Mr. Bell observes—

"I chanced to see a swarm of bees forming around a hive; and on approaching it, discovered the bee-yard, a large oval space securely hurdled around, and containing no less than sixty-seven hives, all tenanted; while many more are being prepared for new swarms. These hives are of wicker-work, covered with clay hardened in the sun. I am told the honey is taken without the destruction of the bees."

The women take an active part in the business of life:—

"Here are neither tailors, shoemakers, nor hatters, every man getting all articles of his dress made by his female relations or friends. In fact, the only tradesmen I have seen or heard of are silversmiths, who ornament urns, gun and sword-smiths, cart-wrights, and a few coopers. Each family builds its own house or houses, the only furniture of which, beside some home-made benches and stools, are chests, mattresses, pillows, and coverlets, brought from Turkey, or home-made; mats from the banks of the Kûban, where the reed they are made of abounds, iron pots, small round tripod tables, or rather trays,

and a few other articles. It may thus be easily conceived how slight a matter is the moving of any household upon an emergency."

But the Circassians, after all, only consider a woman as of one-half the value of a warrior; our fair readers will be shocked to hear, that the legal fine for slaying one, is only one-half the fine for killing a man.

Seville and its Vicinity. By Frank Hall Standish, Esq. Black & Armstrong.

Mr. Standish is known to our readers as the author of 'The Shores of the Mediterranean,' and 'The Northern Capitals of Europe.' (*Athen.* Nos. 503, 556.) The work before us, however, unlike the former, is not a hasty journal, interspersed with occasional descriptions of scenery and manners, but a rather prolix compilation, discussing topics which tourists seldom, if ever, enter on,—and evidently the result of assiduous application and much reading. Mr. Standish appears to have resided for many years in the south of Spain, chiefly at Seville, where, if credit may be given to the *Conservador*, a periodical published in that city, he has spent large sums of money in the erection of handsome buildings, as well as in the acquisition of pictures, and become quite a pet with the Sevillians; and we are not certain whether it was to please the people amongst whom he has so long dwelt, or to serve as an intelligent guide to his countrymen, that Mr. Standish has undertaken this topographical and statistical account of one of the most ancient and interesting cities in the Peninsula.

The early history of Seville, as here given, need not detain us,—indeed, we find nothing in it worthy of attention,—no conjecture started or fact established which is not to be found in the works of Caro, Morgado, Zuñiga, and other native historians,—and much that is visionary and erroneous copied from them;—but we shall abstain from criticism which would lead us into somewhat tedious discussions. We must however observe, that subsequently Mr. Standish judiciously rejects the opinion advanced by the Spanish writers, that the Bœtis was at one time navigable for large ships as far as Cordova. The opinion, indeed, though often repeated, is wholly without foundation—there is no respectable authority in favour of it; and Strabo distinctly states that the Bœtis in his time was navigable only for small barges as far as Ilipla, the modern Peñaflor, and thence to Cordova in boats or wherries.

As might have been expected, Mr. Standish fills several pages with a description of the magnificent cathedral, and the beautiful tower or minaret attached to it; but, as he has done little more than reproduce the errors of former writers, and as our artists have of late directed public attention to this interesting relic, by the many drawings which have graced our exhibitions, it may be well to avail ourselves of this opportunity to throw a light on the subject of its history, and thus warn our countrymen against that slough of errors which has engulfed many, and threatens all to whom Mr. Standish may serve as Cicerone.

The Arabian tower then, which now serves as belfry to the Cathedral of Seville, was not built, as Mr. Standish asserts, "in the year 1000, by a Moor, who used it as an observatory," but by the command of Yakúb, third Sultan of the Almohades, towards the close of 1196. This fact is confirmed by all the Arabian writers of the period, many of whom furnish us with interesting details on the subject. The first African Prince of the dynasty of the Almohades who crossed over to Spain was Abú Yakúb Yúsuf, son of Abd-el-múmen, who reigned from A.H. 558 to 580 (A.D. 1163-84), when he died of wounds received at the Siege of Santarem, in Portugal. This monarch was passionately fond of building, and during a short residence at Seville, he entirely changed the architectural character and appearance of the city: he might indeed have put in a respectable claim to the title of Pontifex Maximus, for he caused a bridge of boats to be thrown across the Guadalquivir, at the very spot where stands the present modern bridge, and built towers to defend it, the whole being completed and opened, as recorded, on the 11th of October, A.D. 1171. He built also a portion of the exterior walls, and erected wharfs along the banks of the river, for the convenience of unloading the numerous vessels which at that time brought to Seville the produce of Europe, Asia and Africa. He repaired the Roman aqueduct now known as the *Caños de Carmona*, and supplied with excellent water every corner of his temporary capital. But the principal building erected by this enlightened monarch was the great Mosque of Seville, which, if we are to judge from the portion of its exterior walls still remaining between the tower and the new sacristy, must have been similar in design and execution to the celebrated Merquita at Cordova. The foundations were laid in the month of October, A.D. 1171, and the work was carried on with such ardour that in September of the ensuing year, service was performed, and a sermon preached therein by Abú-el-Kásim Abd-el-Rahmán Ibn Ghofayr of Niebla; though it was not completed till after his death, and by his son and successor, Abú Yúsuf Yakúb, who, in the year of the Hejra 593 (A.D. 1196), caused a lofty tower to be attached to the building. This he intrusted to his chief architect Jáber, whom the Spanish authors call *Gever*, and who, from the coincidence of his name, has been reputed, though erroneously, to have been the inventor of algebra. This tower, like those of Morocco and Rabát, in Barbary, also the work of the same architect, was, probably, erected for the double purpose of calling the faithful to prayer, and for astronomical observations. On the summit were placed four brazen balls, so large, we are informed, that, in order to get them into the building, it was necessary to remove the key-stone of a door called "The Gate of the Muezzins," leading from the mosque to the interior of the tower: that the iron bar which supported them weighed about ten stone, and that the whole was cast by a celebrated alchemist, a native of Sicily, named Abú Leyth, at the cost of 50,000*l.* sterling. And it is a curious fact, showing the minute accuracy of the writer from whom we quote these particulars, that when, during the earthquake in 1395, 157 years after the overthrow of the Moorish power, these balls, together with the iron support, were thrown down, the latter was weighed, and the weight, as given by one of the historians of Seville, is exactly the same as that stated by the Mohammedan writer.

These particulars, trifling as they are, go far to prove that, without consulting the writings of the Spanish Moslems, it is impossible to describe with accuracy their numerous architectural remains scattered over the Peninsula; and that, if English travellers continue blindly to follow the Spanish writers of local history, we shall never arrive at truth. Mr. Standish, with all his opportunities, seems not to have been aware that both Rodrigo Caro and Morgado, the native historians of Seville, belong to that numerous class, with more learning than judgment, whose credulity was unbounded whenever they touched upon events likely to shed lustre over the country of their birth—a class of writers who, in their eagerness to prove that Spain was colonized by Tubal, the grandson of Noah—that Osiris, Bacchus, Hercules, Atlas, Nebuchadnezzar, and a host of personages no less illustrious, made it the theatre of their exploits many ages antecedent to all historical records—that St. James the Elder and St. Paul visited the Peninsula—have suffered their patriotism to get the better of their common sense, and thereby introduced into the history of their country more fables than the successive labours of critics for upwards of a century have been able to clear away. Mr. Standish, again, places implicit belief in the spurious chronicles attributed to Flavio Dextro and Julian, arch-priest of Santa Justa, works which, though countenanced by Father Mariana and others, have been proved to be the manufacture of Geronimo Roman de la Higuera, an ecclesiastic of Toledo, whose whole life was spent in forging historical documents, for the purpose of exaggerating the ecclesiastical antiquities of his country. Mr. Standish also quotes from Caro some pretended translations of Arabic inscriptions still existing in Seville, so full of errors and absurdities, that they can hardly be excused in Caro himself, who wrote in a credulous age, and are inexcusable in one who, like Mr. Standish, must, it is to be assumed, have bestowed some time and thought in the investigation of the history and antiquities of the Peninsula. And here we may advert to a circumstance, which, in our opinion, has been, and must still be, the source of much uncertainty and confusion in all that relates to the Mohammedan remains in that country. Notwithstanding the solemn promise made by Ferdinand, at the surrender of Granada, to allow to the vanquished the free exercise of their religion, it is well known, that the fiery zeal of Cardinal Ximenez, and the specious arguments of his counsellors, induced him to break his pledged word, and to issue an edict, requiring the Moors either to receive baptism, or leave the country within a stated period. The successors of Ferdinand persevered in the same barbarous policy, and the proscribed race were everywhere subjected to persecution. They could neither enter the army nor the universities, nor profess the liberal arts, nor trade with the newly-discovered countries in America; and, to add to their sufferings, they were handed over to the tender mercies of the Inquisition. Though some enlightened Moors became Christians from an honest conviction of the truth of Christianity, it is impossible they could ever sympathize with the Spaniards, or make common cause with the sworn enemies of their race. There were, however, a few who knew how to conceal their sentiments, or to win the golden opinions of the clergy, and who succeeded occasionally in obtaining employment in offices of trust and responsibility—such as interpreters to the Royal Family, the government offices, or to the Inquisition itself; but in almost every instance these persons were either ignorant of the Arabic language, incompetent to decipher manuscripts and inscriptions, or, which is more than probable, being prompted by their inveterate hatred to the Christians, they delighted to mystify and mislead them. At the head of these stands pre-eminent the Morisco, Miguel de Luna, interpreter to Philip II., well known as the author of that entertaining romance, 'La perdida de España,' which he declared to be a literal translation from an Arabic manuscript, and which has been received and adopted as such by Mariana and the best Spanish historians. Another of the same class was Zacarias, who, in 1570, was employed by the corporation of Toledo to translate the numerous Arabic inscriptions scattered over the city, previous to their being effaced or removed: even the learned and judicious Ambrosio Morales was led into palpable errors by one of this fraternity—a Morisco of Cordova; and Juan Bautista, a sworn interpreter to the Holy Office, whose assistance Rodrigo Caro acknowledges to have received, belonged to the same class of impostors. We could adduce

numberless instances of ignorance or wilful misrepresentation on the part of these semi-Christians, and some of these Mr. Standish has adopted from Caro.

Still Mr. Standish's work is not only useful, but agreeable, and contains within small compass, much useful and varied information; and it will be found decidedly superior, even as a guide, to the 'Guia de Forasteros,' published at Seville under the auspices of the *Asistente* Argona. The very minuteness, indeed, with which Mr. Standish describes the objects of art still to be found in Seville, is, under circumstances, not without interest. Revolution and destruction generally go hand in hand; certainly in Spain, where the chisel and the pencil were for centuries employed in adding lustre to a great, though now prostrated power. Ordinances, indeed, have been issued from time to time, directing the formation of provincial museums, with the pictures and sculptures of suppressed monasteries; but who can be certain that, amidst the endless change of administrations, works of art will ever reach their destination? Already the walls of the Louvre are covered with the finest works of the Sevillian school: and, although to the lover of art it may be a matter of indifference whether the masterpieces of Murillo, Zurbaran, and Herrera are to be seen at Paris or Seville, it must be painful to all to know, that, for every picture smuggled out of the Peninsula, twenty are irretrievably lost. Let the work of destruction which has already lasted seven years, continue but seven more, and works like Mr. Standish's will be the only record of the boasted collections which once existed in that country.

The following sketch of the three leading masters of the Sevillian School—Murillo, Velasquez, and Zurbaran—will be read with interest:

"It may not be amiss in this place, by way of relief to the unavoidable monotony of this detail, to say a few words on the leading masters of the Sevillian school. The three painters whose names have immortalized the Spanish school, are Murillo, Velasquez, and Zurbaran. The first was born in 1618 in Seville, the second in 1599 in the same city, and the third in the village of Fuente de Cantos, in Estremadura, in 1598. They were therefore contemporaries, and all lived to a good age. Murillo died in his sixty-sixth year, and would probably have lived longer, had not his death been hastened by a fall from the scaffolding whilst painting in the Franciscan convent of Cadiz. Velasquez died at the age of sixty-one, and Zurbaran at that of sixty-four. The merit they possessed is the important one of originality; the first of them, however, Murillo, has proved the justice of a remark of Voltaire, that he who copies best is the best original: for perhaps no one imitated so many masters as Murillo, and yet no one can mistake his style for that of any other painter. We have his imitations of Herrera, or Titian in his portraits, of Guido in his Magdalens, of Velasquez in his beggar-boys and fancy subjects, of Zurbaran in his saints; and yet he shines out in all as peculiarly Murillo, and it seems as if he imitated others only to surpass them. His animals are admirably drawn, but he never appears to have loved landscape painting. His sea-views are of extreme rarity, and are spirited, but inferior to those of the high Dutch school. This was not the case with Velasquez, who was perhaps the most universal genius we have known; he could paint animals, landscapes (the knowledge of which he had probably acquired from Herrera el Viejo, his master), the sea, and fancy subjects and historical pieces, with equal ease. In vigour and versatility of genius he equalled Rubens, and drew largely from him. A residence in Italy did not, however, induce him to change his style, and the works of his later years differ little from those of an earlier period, save in a less attention to the minute parts of drawing, and a greater endeavour at effect. No painter managed light better. The aerial perspective of the Surrender of Breda, and of the picture of the artist himself working for Philip the Fourth, and surrounded by his family, is not exceeded by De Hooge, Rembrandt, or the most skilful Dutchman; yet he had not the grace or tenderness of Murillo,—he surprises, but does not woo you into admiration. Much of his time was unfortunately lost in attending on Philip the Fourth, who invested him with the office of chamberlain at court; and the last public act of his life was that of accompanying the Infanta Maria Teresa to Irun, on her marriage with Louis the Fourteenth of France. The wife of Velasquez only survived her husband seven days.—The life of Zurbaran presents us with one of the numberless histories of men, who, born in situations apparently unpropitious for the developement of talent, have nevertheless attained to the highest glory in their profession. He was the son of a country proprietor, and any who are acquainted with the state of that class in Spain (bad as it is now, it was worse then), will consider the eminence to which he advanced as almost a work of magic. He was born a painter; and his early efforts attracted so much notice, that his parents sent him to Seville to study under Rodelas. Before attaining the age of thirty, he had completed the chapel of Saint Peter in the cathedral, and the famous altar-piece for the collegiate church of Saint Thomas Aquinas, the latter of which is considered his master-piece. The paintings of the Carthuja at Xerez were executed in his thirty-fifth year. Neither Murillo nor Zurbaran ever left Spain, and yet their notions of the art were strikingly opposed. Zurbaran copied nobody, Murillo everybody: the first was satisfied to spend days over a white mantle fixed on a model, and occupy himself on a single figure; Murillo was grouping, and varying, and catching at every new form and expression, trusting to his own genius to improve upon nature. Zurbaran threw a strong contrast of light and darkness on the principal figure in the first term, and went no farther. Murillo aimed at and succeeded in conveying aerial perspective to the farthest distance in the sky, and sought to make his outlines melt into the air. Two paintings for the Geronomite convent of Bournos, by Zurbaran, one of which is in my possession, had the outline of the figures rigidly marked on the plain side of the canvas, so hard and inflexible was the system of the painter. Both were fine colourists, and both true to nature; but Murillo toned down his pictures by glazing, and Zurbaran passed a wash over the strong blue and white he employed, and detached the figures by painting the distances lightly. In point of composition, Zurbaran was inferior to Murillo or Valasquez; an observation which the reader may readily verify, by turning to the 'Bavaria Sacra,' with the plates of Sadeler (wrongly quoted in my Notices of the Northern Capitals as 'Batavia Rediviva,') where he will find the subjects of many of the pictures of the two first masters, and particularly that of Saint Isabel washing the Child afflicted with the Scurvy, by Murillo. According to my own taste, the order of precedence I should give to these three great painters, is as I have placed them in the text; others, however, and particularly the French, reverse the order, and quote Zurbaran, Velasquez, and Murillo. Indeed, in England and at Madrid, Velasquez is generally put before either Murillo or Zurbaran."

Mr. Standish's volume contains also brief notices of several painters and sculptors,—as Montañes, Cano, Rodelas, Vargas, the two Herreras, Pacheco, Roldan, Riaño, and Arce,—whose names even will be new to English readers.

We cannot conclude this notice without pointing out a few other errors, which may assist the author, should the work arrive at a second edition. First, then, the No-Do on the armorial bearings of Seville, engraved on the covers of Mr. Standish's volume, is not, as he imagines, "the knot of union and fidelity," from the Latin word *nodus* (p. 286). The origin was this:—Alfonso X., surnamed "The Wise," granted to Seville, the only city of Andalusia which remained faithful to him when his rebellious son rose in arms against him, armorial bearings, consisting of the two monosyllables, No-Do, separated by a skeine, (in Spanish *madexa*,) meaning *No m'a dexado*, (she has not forsaken me). Again, the word "Lonja," (not *Louja*, as erroneously printed throughout,) which means Exchange, is not derived from the Greek, but from the Latin *longa*, because the buildings wherein the exchanges were originally held in Spain were generally long and narrow, consisting of a gallery or colonnade, and they were, in consequence, called *Casa longa*. The Cid was not buried at Toledo, (p. 44,) but in the monastery of San Pedro de Cardeña, near Burgos: and Miramolin is not the name of an Arabian tribe, as stated (p. 49), but a corruption of the words *Amir-al-momenin*, meaning "The Commander of the Faithful,"—a title generally given by the Spaniards to all the Moorish kings of Africa. As to typographical errors—for which, as Mr. Standish is abroad, the printer must be responsible—they are beyond number. Cean Bermudez, the author of a Biographical Dictionary of the Spanish Painters and Sculptors, which Mr. Standish seems to have largely consulted, is invariably mistaken for Zea Bermudez; Azias, Scorro, Banajas, Peraza, Erifan, are written for Arias, Socorro, Barajas, Pedraza, Perafan; even the name of the father of Spanish history is printed Maziana instead of Mariana.

ILLUSTRATED BOOKS.

The Pictorial History of England, &c., with many hundred wood-cuts. C. Knight & Co.

The Pictorial Shakspere. Same publishers.

The Illustrated Shakspere, &c. with nearly one thousand engravings on wood, from designs by Kenny Meadows. Engraved by Orrin Smith. Tyas.

History of Napoleon, with 500 wood-cuts, from designs by Horace Vernet. 2 vols. Thomas.

History of Napoleon, with many hundred engravings on wood, after designs by Raffet, Horace Vernet, and Jacque. Tyas.

Greece, Pictorial, Descriptive, and Historical, by C. Wordsworth, D.D. Orr & Co.

The Pictorial History of Palestine. C. Knight & Co.

The Arabian Nights' Entertainments, with many hundred wood-cuts, after original designs by William Harvey. Same publishers.

Gulliver's Travels, &c., with upwards of four hundred wood-engravings, from designs by Grandville. Hayward & Moore.

Illustrated Fables, with numerous engravings, after designs by J. J. Grandville. Tilt.

The Adventures of Robinson Crusoe, with three hundred engravings on wood, from designs by Grandville. Tyas.

The Devil on Two Sticks, illustrated by Tony Johannot and Gigoux. Thomas.

Sterne's Sentimental Journey, &c., with 100 engravings on wood, from designs by Jacque. Nicholls.

Our riches, "not our will, consent" to this long preamble—which is by no means complete in its announcements. As it stands, however, it is significant of the desires and tendencies of the reading public—desires so urgently expressed, tendencies so unquestionably manifest as to warrant, we presume, a large expenditure on the part of the ministering publishers. Taking this view, a moralist might accompany the catalogue with a very significant commentary; but the subject has been often adverted to in the *Athenæum*. Let us, then, for once, pass unregarded the tastes of the age, and confine ourselves to the manner in which subjects the most dissimilar are now presented—whether a chronicle of Palestine or of Laputa, whether the Kings and Queens of English History or Shakspeare's plays, whether the truths of Napoleon's career, or the fables of Esop, Pilpay, and La Fontaine—let us speak, in short, of the decorative taste as shown in the book illustrations of this year of our Sovereign Lady Victoria, 1840. Let us speak, too, of these illustrations without pretending to dive into the antiquarianism of the subject, by going back to the times of Caxton and the *Nuremburg Chronicle*, or of the rude court-card figures which still head the faëry tales, given to the world of wakes and pedlars on the broad sheets of Catnach. Neither for the moment let us be severely critical in dissecting the amount of artistic merit, in head-pieces or tail-pieces—initial letters or marginal vignettes. A general but not careless glance over the library before us—a few miscellaneous remarks, in a spirit which would

fain be pleased, will be the substance of our critical offendings on the present occasion.

Still, civility, born of satisfaction at the good influence which the dissemination of these works must exercise, should not blind us outright—and, unfortunately, the 'Pictorial History of England,' with which we commence, is, in some respects, of all the publications before us, the least satisfactory. The right plan on which such a work should be illustrated has been followed, in the selection of "monumental records, coins: civil and military costume: domestic buildings: furniture and ornaments: cathedrals, and other great works of architecture: sports, and other illustrations of manners: mechanical inventions: portraits of eminent persons, and remarkable historical scenery;"—but the manner in which these things should be displayed has been somewhat neglected; and this, too, in the palmy days of woodcutting, the powers of which Mr. Knight has so well employed in other of his publications. Many of the landscape illustrations are slight and coarse—many indistinct (this last fault may in part be chargeable on the printing), and some of the portraits,—we need but refer to those of Queen Mary (No. 35), and of Charles Stuart (No. 41),—are of very little, if any, value. The tracings of medals, which are numerous, and among the most valuable of the illustrations, are better; but, on the whole, the book has a tasteless appearance, and the illustrations are not likely to recommend it to the public.

The illustrations in 'The Pictorial Shakspere' are more carefully executed. We might refer for proof, almost at random, to the Grecian views which adorn 'Timon of Athens' and 'The Comedy of Errors,' the delicious glimpses of the houses, palaces, and parks of old England,—Herne's Oak of course not forgotten, which Mr. Creswick has contributed to 'The Merry Wives of Windsor;'—better these realities than all the feeble and fantastic presentments of Master Slender and Sir Hugh Evans,—better than the summed farce, and cowardice, and self-indulgence, which the best of our comic painters have been able to throw into *his* vision of Shakspeare's fat knight. We might also commend the vignettes of Southern scenery, introduced into 'Othello' and the 'Merchant of Venice,'—and of the wilder, but not less picturesque retreats where Imogen was guarded and lamented, by those princes in the weeds of shepherds,—

> ——gentle
> As zephyrs, blowing below the violet,
> Not wagging his sweet head: and yet as rough,
> Their royal blood enchafed, as the rud'st wind,
> That by the top doth take the mountain pine,
> And make him stoop to the vale.

Nor know we anything, after its kind, better than the execution of some of the heads and figure pieces, as, for instance, the fool's head in the notes to the first act of 'King Lear,' by Sly (the wood-cutter's name whimsically appropriate)—or that grand study after Sir Joshua, in the same play, where the painter was visited by a glimpse of the aged monarch, his white hair streaming abroad in the hurricane, less wild than the storm raised in his own breast, by the spells of Ingratitude, taking that most terrible of all forms, "a thankless child." Another wood-cut, excellent in its effect, is the cloister scene in the Countess of Roussillon's Palace, gracing the fifth act of 'All's well that ends well.' We could justify our praise by many more specimens, and must add, that the more strictly antiquarian figures and details introduced, are finished with great care and clearness. Had the illustrations stopped here, they would have offered no weak point for criticism to point its finger at. But this is not the case. In Mr. Knight's sensible advertisement, he disclaims any intention "to please the eye only, and to vitiate the taste by introducing theatrical representations of those scenes of passion which even the best actor fails in delineating, and which the best pencil renders prosaic and all but poor." But in spite of a resolution so judicious, there are certain figure pieces in 'Romeo and Juliet,' in 'Lear,' in 'Cymbeline,' in the historical plays, where the literal form of illustration has been forsaken, and the ideal attempted. Every drama, too, has its title-page, in which all the *dramatis personæ* are *arabesqued* into a group by Mr. Harvey, and, grieved though we be to say it, these are all indifferent, some bad. Our designers might take lessons how best to combine the fanciful with the real, from Retzsch, and Bendemann, and Hubner, the exquisite border designs of Neurether, nay, the simple groups which illustrate such comparatively unambitious publications as the 'Fest Kalendars;' and in mechanical matters, such as correct drawing, from all German and French artists. We must, indeed, be excused if we here favour them with a quotation which, besides touching higher matters of art, bears upon the causes of the want of taste we have been just lamenting. If, says a pungent and free-spoken observer who illustrates *The Artist* in the 'Heads of the People,' "we read the works of Professor Lempriere, Monsieur Winckelmann, Professor Plato, and others who have written concerning the musty old Grecians, we shall find, that the artists of those barbarous times meddled with all sorts of trades besides their own, and dabbled in fighting, philosophy, metaphysics, both Scotch and German politics, music, and the deuce knows what. A rambling sculptor, who used to go about giving lectures in those days, Socrates by name, declared, that the wisest men in his time were artists. This Plato, before mentioned, went through a regular course of drawing, figure and landscape, black lead, chalk, with or without stump, sepia, water-colour, and oils. Was there ever such an absurdity known? Among these benighted heathens, painters were the most accomplished gentlemen, and the most accomplished gentlemen were painters: the former would make you a speech, or read you a dissertation on Kant, or lead you a regiment, with the very best statesman, philosopher, or soldier in Athens. And they had the folly to say, that by thus busying and accomplishing themselves in all manly studies, they were advancing eminently in their own particular one. What was the consequence? Why, that fellow Socrates not only made a miserable fifth-rate sculptor, but was actually hanged for treason! And serve him right. Do *our* young artists study anything beyond the proper way of cutting a pencil, or drawing a model? Do you hear of *them* hard at work over books, and bothering their brains with old musty learning? Not they, forsooth: we understand the doctrine of division of labour, and each man sticks to his trade. Artists do not meddle with the pursuits of the world, and, in revenge, the rest of the world does not meddle with artists."

What, if Titmarsh speak the truth? Mr. Kenny Meadows, in illustration of whom he has thus speculated, will, with the rest of the fraternity of English book artists, believe him more readily than the *Athenæum*, because he does what we do not—give the body credit "for studying the proper way of drawing a model." And in justification of our incredulity, a more striking instance of gifts capriciously cultivated or carelessly exercised could hardly be cited, than the artist just appealed to—*vide* his 'Illustrations to Shakspere.' He has not approached the dramatist on Mr. Knight's safe principle of operation. Clever-handed, sometimes graceful, at others extravagant—quick at throwing off those superficial peculiarities of feature which stand for, but are not, character—he flies at all game. No Tragedy is too sublime, no Comedy too grotesque, for this Proteus of the pencil. He gives us his Lady Macbeth with the lamp set down, while in her dream she washes her blood-guilty hands, with as little hesitation as Sir John trafficking with Master Brook for the good graces of Ford's wife. He dashes off Hamlet, tormenting the lady

> Of ladies most deject and wretched,

by his strange questionings and replies or searching the inmost spirit of his Mother, as confidently as the speculating Grave-diggers. This versatility is, in itself, an evidence of talent:—moreover, in all the power of seizing a feature, and illustrating it by some appropriate and whimsical type and combination, Mr. Meadows is apprehensive, quick, and fanciful. There is a richer invention—we may point, for proof, to the Comedies, especially 'Much ado about nothing,' 'Cymbeline,' and 'The Taming of the Shrew'—in his emblematical arabesques and vignettes, than we could match in any contemporary English work we know of; strangely alternated with a power over the rude and ferocious: witness the head and hands of Barnardine, in 'Measure for Measure,' clutching, with a brutally lethargic grasp, the grate of his prison. Mr. Meadows, in short, is observant and imaginative, but study and experience are wanting. Figures ill-drawn, grimacing masks for faces, and distorted postures for attitudes, are, throughout the series, so provokingly mixed with the above indicated evidences of genius, that we could find it in our hearts to be more strict in our questionings than Titmarsh himself. But for this time, and in this place, "*sessa*, let the world slide."

Of the illustrations of the pair of Lives of Napoleon, there is not much to be said in praise or dispraise. The subject is not a tempting one; and, after turning over a hundred pages of each, the eye becomes as weary of epaulette and sword-belt, drum, and gun carriage combined, as of the "pride, pomp, and circumstance" in that chamber of the Versailles galleries which is hung with the battles of Vandermeulen. Yet no one has been more happy in hitting off the character, and exhibiting the performances of the *moustache*, than Horace Vernet: witness his full-length of the profligate fellow making himself as comfortable, by the side of a confessional, in the Casa Santa of Loretto, as if Christendom had never had other Pope than *le petit Caporal*. MM. Raffet and Jacque do not, like Vernet, belong to the artistic Legion of Honour, but they are more correct, as draftsmen, than our countrymen: and the latter, in the few numbers of the 'Sentimental Journey' now before us, proves that he can enter into the Shandean spirit of his author. The execution of these cuts is also highly creditable: the Monk's head, though a trifle too severe in its expression, cut by Bastin, almost deserves to pair off with the Lear we were admiring some two paragraphs since.

In 'Greece' and 'Palestine,' as here illustrated, and brought home, we are on the Englishman's stronghold—landscape drawing: the latter work, in particular, is full of beautiful and interesting subjects. What, indeed, our artists can do in this way may be seen by referring to the vignette landscapes illustrating the stories of Sindbad—we beg Mr. Lane's pardon, Es-Sindiba'd—part 21st, and of Joodar, part 24th, in his edition of the 'Arabian Nights.' We hardly know how to praise these enough: yet we have still to praise more highly two views in Constantinople, (p. 182, part 24th, and p. 374, part 27th) in which clearness, finish, and pictorial effect in rendering the rich and picturesque architecture of the City of the Sultan, could not be carried to a higher point of perfection. We have already spoken of Mr. Harrey's designs to this work: by the grace and spirit with which they are carried forward, they would seem to monopolize his "good right hand," leaving his left only to work on Shakspeare title-pages. What we like least are the heavy and crowded marginal illustrations, where a procession of figures, or a history, told in several groups, after the manner of the old Flemings, sprawls over the greater part of the page, leaving a gap for the letter-press.

The last four works on our list are fair examples of French book-illustration, though none of them equal to the first of their class; the 'Gil Blas,' by Gigoux, the 'Molière,' by Johannot, or the beautiful 'Les Évangiles,' we think by Deveria. Grandville in the 'Fables' is full of a racy and pleasant humour. In throwing a human purpose and meaning into animal physiognomies, he is a formidable competitor to our own Edwin Landseer: and the inimitable Poodle-Chancellor of the latter is hardly more sagacious than the "Fox and the goat at the well," or than the "Frog and the ox," or the fatal walk, taken by Earthern Pipkin with Iron Pot, which we miss from the English translation before us. The propriety, probability, and unwearied attention to proportion and detail, conspicuous in these illustrations, we earnestly recommend to our English designers, as essential adjuncts to fertility of fancy and freedom of hand. These good points, however, fail to recommend to us the Gulliver illustrations: those inimitable satires being, in our judgment, unsusceptible of pictorial adornment. We cannot believe in the Brobdignags; they are, after all, only to be distinguished from human figures by an act of faith which, making pigmies of ourselves, gives us a pigmy sympathy with Gulliver: while the action and the passion of the Lilliputians demand microscopical study to be brought home to our credence. It is no derogation from M. Grandville's cleverness, that fancy is more pliant than sight—and that the Dean's artfully constructed pages carry us to a point beyond our experience, which no painted wonders would ever enable us to reach. The strangeness of the

> "Anthropophagi and men whose heads
> Do grow beneath their shoulders,"

would be mere folly and absurdity if formally exhibited, like the ladies in the burlesque of 'Bluebeard,' a'noddin' with their heads beneath their arms!

But enough for to-day of these picture books.

OUR LIBRARY TABLE.

The Clandestine Marriage, and the Sisters, by Ellen Wallace, 3 vols.—Ellen Wallace is too regardless of the progress of incident, too much disposed, in her delinention of feminine archness, to cross the line which separates playfulness from sauciness, and her style is disfigured by a superabundance of short sentences; but, these faults allowed for, she possesses thought, feeling, humour, observation, and a way of her own, sufficient to recommend the 'Clandestine Marriage,' not merely to the omnivorous novel-reader, but to the thinker also, who values the story less than the truths it contains. Her first tale is devoted to the doings and sufferings of a spoiled beauty, one-half of whose airs and graces are ascribable to a cause unguessed by her—namely, her attachment to the manly and distinguished family friend, who has patience with her in all her love troubles—defends her tenderly, when robbed of name and position and wealth by the death of her father, whose offspring she was by a Catholic marriage—lectures her, when her spirits become hoydenish, and her temper violent—yet, by yielding to her whims, covertly encourages her in her vivacity and self-will. Seldom has there been a prettier apposition of characters than that of Fanny Carvalho and Mr. Mapleton; the group of which they form the centre being pleasantly made up by sundry foils and contrasts—such as the vulgar, scheming Thornhills, Sir James Nugent and his haughty mother, and Miss Denham, the woman of understanding and literary taste, who, because she resembles anything rather than the heroine of romance, deserved to have been left at the close of the second volume, with something more decisive than the chance of a husband, who, after all, is not worthy of her. The woman of intellect and genius is a favourite character with our authoress, who reproduces her in another and more engaging form, as the heroine of her second tale, 'The Sisters.' This, if more interesting as a story, is not more full of shrewd observation, sound sense, and a certain moral tone, superior to the common cant which passes current in the fictions of the day. We have been greatly pleased with these volumes.

The History of a Flirt, 3 vols.—Here is another domestic story, of still higher merit: strange to say, there are "some lively touches" in the 'History of a Flirt,' which bring it into such close relationship, as regards style and spirit, with 'The Clandestine Marriage,' that more improbable things have been than an identity of authorship between the two novels. Be this how it may, we are disposed to think that the 'History of a Flirt' is among the best novels of its kind for many years given to the world by the English press. Easy in manner, sound in moral, various in its display of common-place and uncommon character, the lively Louisa Vansittart's chronicle of her misdeeds thoroughly succeeds in enchaining attention, and makes up a healthy, wholesome, agreeable book. The Flirt contrives, even when most heartlessly playing with hearts for stakes, to rescue herself even from the contempt and disapproval of such severe moralists as critics should be. We cannot cease to care for her, though she write down among her sins three distinct engagements of marriage, and the calamities caused by her breaking the same; because we wish her cured—we know she must be—and cured she is, most naturally, with enough of poetical justice in the shape of suffering to content us. There is novelty and spirit, too, in the combination of characters among whom she moves—Miss Partington, with her nonpareil among suitors, Sir James Langham—the heroine's sweet sister Mary, who seems born with a passion for nursing old men, as some are born to nurse babies—and the Bath and Southampton groups, &c. But the book is one to defy illustration or extract; the incidents are so dovetailed, that a single one cannot be detached, —and the characters unfold themselves in the progress of the story, without being described formally or with set phrase. All that we can do is, to avoid forestalling the interest of those whom this novel is likely to concern, and heartily to recommend it, as a genuine, useful, and interesting antidote to the long evenings of the coming winter.

List of New Books.—New Marginal Readings and References to the Holy Scriptures, by the Rev. W. Burgh, "Matthew," 12mo. 2*s.* 6*d.* cl.—Leslie's Case Stated between the Church of Rome and Church of England, 12mo. 3*s.* bds.—Tales of the Blest, a Poem, by Richard Barker, 1st series, 2nd edit. 32mo. 2*s.* cl.—Smith's Key to Pleasant Exercises in Reading, 12mo. 2*s.* 6*d.* cl.—The Dacoit and other Poems, by S. Sloper, 18mo. 2*s.* 6*d.* cl.—Showell's Housekeeper's Account-Book for 1841, 4to. 2*s.* swd.—Victoria Golden Almanac for 1841, 32mo. 6*d.* swd.—Captain Hall's Fragments, 1 vol. royal 8vo. 16*s.* cl.—Voyages and Travels, by Hull, Ellis, and Pringle, 1 vol. royal 8vo. 16*s.* cl.—The Dramatic Works of Wycherley, Congreve, Vanburgh, and Farquhar, 1 vol. royal 8vo. 20*s.* cl.—The Dowager, or New School for Scandal, by Mrs. Gore, 3 vols. crown 8vo. 31*s.* 6*d.* bds.—Scenes in the Life of Joanna of Sicily, by Mrs. Ellet, royal 8vo. 1*s.* 6*d.* swd.—Memorials of a Pupil, 18mo. 1*s.* cl.—Collison on Cemetery Interment, fc. 7*s.* cl.—Riddle's Ecclesiastical Chronology, 8vo. 15*s.* cl.—Grant's Portraits of Public Characters, 2 vols. 21*s.* cl.—First Exercises in Light, Shade, and Colour, 18mo. 4*s.* cl.—Bree's Glossary of Civil Engineering, 8vo. 18*s.* cl.—Timbs's Popular Errors, Part I. 12mo. 1*s.* swd.—Master Humphrey's Clock, Vol. I. imp. 8vo. 8*s.* cl.—"Valentine Vox," 60 plates, 8vo. 21*s.* cl.—Davis's Elements of Obstetric Medicine, Part I. 8vo. 10*s.* swd.—Elliotson's Human Physiology, 8vo. 42*s.* cl.—Pereira's Materia Medica, Part II. 8vo. 24*s.* cl.—Tanner's American Traveller, 12mo. 7*s.* 6*d.* cl.—The Death of Abel, done into blank verse, fc. 8vo. 3*s.* 6*d.* cl.—The Paris Sketch-Book, by Mr. Titmarsh, with engravings, 2 vols. post 8vo. 21*s.* cl.—Liston's Operative Surgery, 3rd edit. 8vo. 22*s.* cl.—Howship on Discrimination and Appearance of Surgical Disease, 8vo. 10*s.* 6*d.* cl.—Turner's Elements of Chemistry, 6th edit. Part III. No. II. 8vo. 5*s.* 6*d.* swd.—Quain's Anatomy of the Arteries, Part I. 12*s.* swd.—Sowing and Reaping, by Mrs. Howitt, 18mo. 2*s.* 6*d.* cl.—Percy's Reliques of Ancient Poetry, royal 8vo. 8*s.* 6*d.* cl.—Warton's History of English Poetry, new edit. 3 vols. royal 8vo. 1*l.* 16*s.* cl.—Memoirs and Remains of the Rev. J. Griffin, 8vo. 10*s.* 6*d.* cl.—Isaiah Translated, with a Commentary, by the Rev. Dr. Henderson, 8vo. 16*s.* cl.—Rev. J. H. Newman's Lectures on Justification, 2nd edit. 8vo. 10*s.* 6*d.* bds.—Bonnycastle's Mensuration, 18th edit. 12mo. 4*s.* 6*d.* bd.—Mavor's Eton Latin Grammar, new. edit. 12mo. 2*s.* 6*d.* sheep.—De Porquet's Key to Portuguese Trésor, 12mo. 3*s.* 6*d.* cloth.

FOREIGN CORRESPONDENCE.

He's gane, he's gane! he's frae us torn,
The ne best fellow e'er was born.—BURNS.

My dear Sir,—Oobee, whom we visited in his province of Sömēn, having prohibited us, and indeed all white men, from passing through his territories to Göndăr, my brother and myself were compelled, in the early part of June, to retrace our steps towards the sea frontiers of Tögrāy. We were delayed at Dögsa, and I proceeded to visit the road which, passing through K'äyăk'or and Goura', connects, by a gentle descent, the table-land of Tögrāy with the *kwalla*, near Mussăwwa'. This is the military road followed by Christofo de Gama, and recently, but imperfectly, described by Von Katt. On my left stood the Convent of Beezēn, conspicuous amidst an almost insulated group of tall hills. Having measured a small base near Adwa, and carried a few triangles from Mount Bwaheet, in Sömēn, to Mount Börk'ăk'o, near Dögsa, I resolved to place my theodolite on the convent belfry, and thus connect my little survey with Mussăwwa', Hharckeecko, and Mount Gădăm, on the sea coast. I was, however, obliged to leave my work unfinished: a dreadful accident deprived me of one of my eyes, and I have hastened here in quest of medical advice, which has been unremittingly but uselessly administered. I am now obliged to return to Europe. My sight is so very weak that I cannot look into my closely-penned manuscript to give an account of my last journies through Tögrāy. When I left Mussăwwa', in July, my brother was about to settle his winter quarters at H'alay or Dögsa, in order to complete a history of the wars under Ras Wälăd Sälasē. Since then I have had no news from Northern Abyssinia.

The misfortune which destroys all my prospects as a traveller is not yet the greatest which the lovers of geography have to deplore. Two enterprising Europeans have lately died on the confines of Shăwa, whither they had proceeded, by way of Tajoura. I never had the good fortune to meet Mr. Ayrstone, but my friends in Egypt and Arabia have described him as a gentleman, who, like Mr. Lane, and some other chosen few, entered fully into the spirit of Eastern manners. His principal object was to study the language and literature of Southern Abyssinia. He was long delayed on the coast, probably on account of the scarcity of caravans, and when near the kingdom of Sahla Sälasē, he was seized with that *kwala* fever so fatal to all white men in the lowlands of Africa. M. Rocher, a French chemist, then returning from Ankobăr to Egypt, bled Mr. Ayrstone and procured a temporary relief. This was contrary to the practice of the Ethiopians, who contend that blood-letting is fatal in a *kwala*. Your countryman, nothing daunted by the death of his Egyptian servants, pursued his course to the highlands, where he communicated with the Rev. M. Krapf, a missionary of the Church of England, who obtained permission to present him to the King of Shăwa. Mr. Ayrstone died on the following morning, alone, and without having reaped the fruits of a tedious, but novel and interesting journey.

This unfortunate young man was followed at a short distance by Herr Kielmaier, lately an officer of Engineers in the kingdom of Wurtemburg. He had resided several months in Adwa, spoke Arabic and Amarña, and was well inured to the laborious mode of travelling in Africa. By an oversight, which I have not been able to comprehend, he drank some water from a deadly well, and immediately felt that his last hour was drawing nigh. His faithful Abyssine follower carried to Shăwa a piece of copper quite corroded by a short immersion in that fatal spring. I have known personally H. Kielmaier, and have never in the course of my long wanderings met a gentleman so generous and so high-minded.

A'den, Sept. 1, 1840. ANTHONY D'ABBADIE.

TENTH MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

[*From our own Correspondents.*]

MONDAY, SEPTEMBER 19.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

Professor Forbes in the chair.

Report of a Committee consisting of Sir John Herschel, Mr. Whewell, and Mr. Baily, for revising the Nomenclature of the Stars. Appointed at Newcastle.

The revision of the northern hemisphere and the constellations visible in Europe, has been continued by Mr. Baily, by carefully tracing the just and most authentic limits of the existing and recognized constellations, and by a careful examination of the several stars, in the course of which many singular instances of confusion and error in naming and placing have been detected. This process, which involves an investigation of the history of each star, and of the designations it has received from each of its observers, and in the several catalogues in which it occurs, is nearly complete, and may be considered as clearing the ground for a systematic nomenclature of the northern stars, as well as for an effective table of synonyms of each star.

In the southern hemisphere, or rather in those constellations which are only visible to an observer in that hemisphere, Sir John Herschel has continued, and nearly completed, a chart of *those stars only*, and of *all those stars* which are distinctly visible to the naked eye in a clear night; in which chart each star is represented of its true magnitude, according to a scale, in which the total interval from the stars of the first magnitude to the lowest inserted, in place of six degrees, is made to consist of eighteen, so as to subdivide each magnitude into three. The final assignment of these magnitudes, resting on the collation and inter-comparison of an extensive series of observations, made for that express purpose with the naked eye, occasionally assisted by a common opera-glass, has been a work of much time and labour, and

is not yet quite completed. Nor till this is accomplished, can any further progress be made in the rearrangement of the southern constellations, which at present are in a state of great confusion.

A small part only of the grant of *50l.* has been expended, but the whole will, no doubt, be required; and your Committee therefore recommend its continuance.

Signed, for the Committee, J. F. W. Herschel.

Report of a Committee for the Reduction of Lacaille's Stars in the Cœlum Australe Stelliferum.—The reductions of all the stars in Lacaille's Cœlum Australe Stelliferum are finished; and Mr. Henderson's assistant is at present arranging the results in the form of a catalogue, which, however, could not be completed in time for this meeting. The completed portion, so far as finished, has been transmitted to Mr. Baily, to be used in the construction of the new Catalogue of the Astronomical Society. No money has been spent during the year; but of course a renewal of the grant will be desirable.

Signed, for the Committee, J. F. W. Herschel.

The President then read the following letter from Mr. Redfield, of New York, to Sir John Herschel:

New York, July 28th, 1840.

Sir,—The interest which you have manifested in the progress of meteorological science, encourages me to commit to your care the accompanying plans and memoranda relating to American storms and tornadoes. The map which illustrates the direction of wind in the great storm of December 15th, 1839, at noon, with its accompanying schedule of observations, I beg you to offer to the British Association, at the September meeting in Glasgow, unless you should deem it inappropriate, or consider some other disposition of the same as more desirable, which I submit to your better judgment. The sketch of the various directions of prostration found in a section of the track of the New Jersey tornado, of June 19th, 1835, with its schedule of observations, was designed to furnish you with some of the evidences of rotation found in the track of the tornado. Some distinguishing facts which are thus presented, I deem to have been overlooked by others, or at least misapprehended in their bearing. But although this single sketch of tornado action was thus mainly intended for your private use, yet, on penning some remarks to accompany it, I was reminded of the claims which Prof. Bache had upon me, growing out of my published remarks on the discussion at Newcastle in 1838; and as the subject is not unlikely to engage attention at the ensuing meeting in Glasgow, I have thrown into short compass, some of the considerations which appear to me to establish the whirling action. From these, and various other observations in my possession, I trust to be able successfully to meet, if necessary, any objections which have been, or may be, started against the whirlwind theory, as applicable to gales and tornadoes. But for this, it is necessary that the objections should be made in a printed and responsible form, in order that the true state of the case may not be mistaken or evaded. As regards the map and schedule of observations for the December storm, perhaps I should not have taken the trouble to prepare them, had it not been intimated to the public, in reference to my former account of this storm, as it appeared at sunset, that had the observations been given for the middle of the day, the wind arrows at Nantucket, at Cape Cod, and at New Bedford, and with the ship *Morrison*, would all have pointed in towards a central line. The futility of this assumption, however, is sufficiently apparent. It has long been my intention to prepare and publish a more full examination of the phenomena of the New Jersey tornado, and other destructive whirlwinds; but my avocations and habits are not the most favourable to the execution of this design.

I am, &c. W. C. Redfield.

P.S. The papers will be paid to London, and will probably need some editorial supervision, unless the facilities afforded by the Atlantic steamers are sufficient to allow of my seeing the proofs before going to press. I cannot, however, expect you to be troubled with these matters, having, I fear, already presumed too much upon your kindness. I should esteem it a favour, however, to be informed of the disposition which you may make of the papers, and of the time when it may be proper to print them on this side of the Atlantic. Should the roll of papers not reach you promptly, it may doubtless be found at the office of the *British Queen* steamer in London.—W. C. R.

Sir J. Herschel inclosed this letter to Prof. Phillips, and observed, "as Mr. Redfield's papers cannot be heard of at the British Queen office, they must be regarded as lost—a sad pity."

Report on the reduction of Meteorological Observations made at the Equinoxes and Solstices, on the part of a Committee appointed at Newcastle.

Sir J. Herschel, referring to his report of last year for the reasons why the reduction of these observations was not immediately commenced, reports further that the same reasons delayed any effective commencement of the work until very lately; but that, owing to several wanting series of observations having at length come to hand, so as to render the series for the years 1835–8 tolerably consecutive, at least for several localities, your Committee considered it advisable to wait no longer, but proceed to work with the materials in hand. Accordingly, having cast the plan of operations for the comparison and projection of the barometric oscillations in those years, (to which, for the present, your Committee propose to limit their proceedings, till it shall appear whether a further and more complete comparison, including the thermometric changes, and especially the correspondence of the winds, seems likely to lead to any valuable conclusions,) the reduction, arrangement, and projection of the several series of observations was confided to the able and zealous hands of W. R. Birt, Esq., who is now actively employed in this operation, and who has enabled your Committee to lay before the Meeting, as specimens of the mode of proceeding, the tabulation and projection of the observations made in the British Isles in the year 1836, which are, accordingly, submitted for inspection. In the discussion of these observations, it has been found advantageous to divide the stations from which they have emanated into groups, according to geographical proximity, the chief of which are,—the group of the British Isles, that of the continent of Europe, the North American, South African, and Indian groups. Each of these groups is referred, by applying the differences of longitude to the times of observation, to a central station; and the projected curves, in which the abscissæ are the mean times at that station, and the ordinates the reduced barometric altitudes, exhibit at one view the correspondence or disagreement of the barometric movements for all the stations of the group. The numbers which serve for the projections are tabulated in the skeleton forms annexed, which appear well adapted for general adoption in such reductions, and of which, therefore, half-a-dozen blank copies are annexed, as specimens for such members as may take an interest in the subject. The projection of these curves is the first step in the process of reduction contemplated; and, even in the very limited range afforded by the specimens now presented, affords ground for interesting remark. Thus we see that the march of the barometer in the only two Irish stations which have furnished observations, (Markree and Limerick,) while agreeing well with each other, differs most decidedly from its corresponding march in all the English stations; which, on the other hand, offer a good correspondence, *inter se*. A letter from Mr. Birt, on this subject, is annexed to the present report. It would be premature, at present, to enter fully into the details of the further steps contemplated in these reductions, as they will be, of necessity, materially influenced by the aspect under which the subject shall present itself in its progress, and especially by the discussion of one or two of the most complete series among which, thanks to American zeal and industry, the group including the United States promises to be the most prominent. Only a very trifling sum (under *2l.*) has been hitherto expended (for the printing, by Messrs. Stewart & Murray, of the skeleton forms,) out of the original grant of *100l.*, but the continuance of the grant will be required to meet the further requisite expenses. It is only justice to Mr. Birt to observe, that his part of the work appears to be executed with great care and judgment.

(Signed) J. F. W. Herschel.

Metropolitan L. and S. Institution, Sept. 3, 1840.

Dear Sir,—I herewith inclose the four sheets of curves mentioned in my last, also the tables of reduced barometric readings from which they are projected. The curves of England and Ireland generally differ, in some cases considerably, with the exception of those observed in December 1836, on which occasion the similarity between the Markree, Oxford, London, and Ashurst curves, especially as their apices occur about the same hour, is interesting. The occurrence of the apices of the Edinburgh, Halifax, and Oxford curves at later periods, and in the order here mentioned, appears to indicate a progression of the barometric undulation from the north or north-east, and some of the remaining sheets also indicate a progressive movement. I have not yet proceeded either to rounding off the curves, or to reading off the altitudes on the hour lines. In the first instance, the undulations only, which, from the hourly observations assume a rising and falling in straight lines, thus

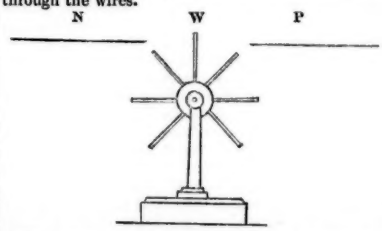
will probably require a gentle rounding, so that the summit should pass through the point, thus

for I see clearly, as you observed, that the points must not be interfered with on account of the similar flexures in different curves. Do you consider any advantage would be gained from combining curves that are evidently similar, so that means of those similar curves may be obtained from similar altitudes, above or below the mean line, by bringing the apices and flexures on the same vertical ordinates, allowing for difference of longitude? The general dissimilarity of the curves obtained in Great Britain and Ireland has suggested this to me; also, that in future observations of the kind, it would be desirable to have the stations augmented, and, if possible, the observation of a complete elevation and depression at each. I remain, &c. W. R. Birt.

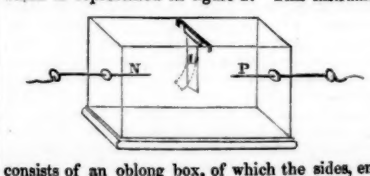
P.S.—In the Halifax curve of September, there are, probably, two errors; I have, accordingly, left the curve incomplete. The scale I have used is 1.5 of the larger divisions, equal .1 of an inch.

'On the Theory of Electricity,' by C. J. Kennedy.

When an electrical current is passing through an imperfectly conducting medium, such as atmospheric air, the electrical particles being retarded, must be accumulated in the track which is traversed by that current. This fact supplies the means of determining whether there are two electric fluids, or only one. If there were two fluids, the particles of each would be accumulated in the line of discharge. If the velocity of the two currents were uniform and equal, each section of the track traversed would necessarily contain as many of the vitreous as of the resinous electrical particles. Hence, when such a double electric current was passing between two similar metallic wires, a light body suspended midway between the wires should remain unmoved, supposing the electrical intensity of the two wires to be equal; for it would be urged with equal force in opposite directions. But if there is only one electric fluid, that electric fluid being retarded, and its particles accumulated in the line of transit, the air situated in that line must become positively electrified in the central section; and throughout the line the positive state must predominate. Hence, a light body placed midway between the two wires ought to be urged towards the negative wire. Probably the proof alleged to establish the reality of a direct impulsive power in the particles of electricity may be entirely illusive. But, independently of any direct impulsion by the electric particles, the light body should be urged towards the negative wire. For the current of air emitted from the positive wire being superior in length and intensity to that emitted from the negative wire, must be urged onwards with superior force under the influence of the attraction and repulsion of the two opposite wires. The positive wire repels, and the negative wire attracts every positively electrified aërial particle; while, on the other hand, the positive wire attracts and the negative wire repels every negatively electrified aërial particle. But as the positively electrified aërial particles exceed the negatively electrified aërial particles in number and intensity, the united force of the former particles must be superior to the united force of the latter. Hence the aërial electrified current proceeding from the positive wire must, on the theory of a single fluid, be superior in force to the electrified aërial current proceeding from the negative wire. It is so; and this fact decides the point at issue. A light broad-vaned wheel W (fig. 1st), delicately suspended, carefully balanced, and placed exactly midway between the two wires P and N, moves from P, the positive wire, towards N, the negative wire, when an electric current is transmitted through the wires.

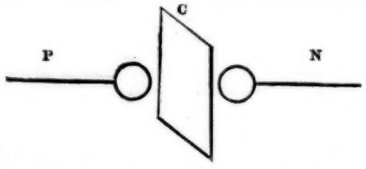


The same sort of result is obtained by means of the Cratoscope, a very simple and effective instrument, which is represented in figure 2. This instrument



consists of an oblong box, of which the sides, ends, and cover are of varnished glass. Two similar metallic wires, P and N, pass through holes drilled in the ends, and are moveable, so as to admit of being accurately adjusted at any required distance from L, a slip of gold leaf suspended from a thin metallic

flap attached to a wire which passes across the middle of the glass box, where an opening is left in the cover. Over this opening a plate of glass is laid. The slip of gold leaf is thus completely protected from being agitated by motions in the neighbouring air. It obeys the slightest impulse of the electrified aërial currents which are emitted from the wires P, N, when these are electrified. This is effected by connecting the rings of the wires P N with two equal wires about four feet long; the one of which is inserted into a hole in the end of the positive, and the other into a hole in the end of the negative prime conductor of the electric machine. The wires P N are then accurately adjusted to equidistance from the leaf L. Previous to the principal experiment, it is ascertained —by a simple and satisfactory experimental test— that the attractive powers of the wires P N are precisely equal to each other. The electric machine is then worked, when it is found that the gold leaf instantly moves *from* the wire P towards the wire N. This shows the power of the electrified aërial current thrown off by the positive to be superior to that of the electrified current thrown off by the negative wire. On reversing the connexions, the direction of the movement in the leaf still is *from* the positive towards the negative wire. This experiment contradicts the theory of two fluids, and establishes the theory of a single fluid. It is an *experimentum crucis*: it decides the point in dispute. No hypothetical force has been introduced into the preceding explanation—nothing has been employed but the known electrical powers. If the vitreous electric fluid is supposed to be less retarded in traversing air than the resinous fluid, the result will be altered, but will be still more hostile to the theory of Du Fay; for then the resinous electricity ought to predominate in the aërial interval, and the light body should be urged towards the positive wire, not from it, as is the fact. There are other *experimenta crucis*, all concurring to establish the theory of a single electric fluid. Mr. Porret and M. De la Rive found that a line of water lying between the opposite wires of the voltaic battery was urged from the positive or vitreous towards the negative or resinous wire. When a strong saline solution possessing considerable conducting power was employed, in place of the water, the same result was not obtained. The reason is obvious. The electricity was little retarded, and therefore was not accumulated to any sensible amount, in the line of transit between the oppositely electrified wires. The aqueous line did not become sensibly electrified, and therefore could not be urged from the positive or vitreous wire by the repulsion of that wire, and the attraction of the opposite wire. The results completely harmonize with those obtained when the electric transit is made through an interval of atmospheric air. When an insulated card, C, is pierced by the electric



discharge passing between two equidistant and equally electrified knobs, P, N, it is perforated at a single spot, where a hole is formed, having around it two burrs, one on each side of the card. This proves that at the instant of perforation the particles of the card are disrupted by a divulsive force acting in both directions. On there being but one perforation made, nothing need be founded. The passage of one electric fluid, or of two, through the perforated spot, might alike explain the occurrence of a single perforation, provided that the simultaneous passage of *equal* quantities of the two opposite electricities through one single spot of the card, were capable of originating *there* a disruptive force among the particles of the card. But the simultaneous addition of equal quantities of the two electricities to the spot which they traverse, must leave that spot still in the neutral state. Why then should the particles of the card in that spot burst asunder? Why, on the theory of two fluids, should there be a perforation made at all? On the theory of one fluid, there ought to be a perforation; for the electric particles being suddenly arrested in their motion through the card, must be accumulated in the spot through which they pass, that spot must become intensely electrified *plus*, and therefore its corpuscles must have a strong tendency to burst asunder, according to the law that "similarly electrified bodies repel each other." And, since the one knob is electrified positively, and the other negatively, the former knob must at the moment of rupture repel, and the latter attract, the disrupting particles of the card. Hence the burr on the negative ought to be greater than the burr on the positive side of the card. It is so, even when every precaution has been taken to insure equality in the intensity of the opposite knobs. The superior length of the positive or vitreous spark, and the superior extent of the light at the positive point, might also be pleaded in corroboration of the evidence already adduced;—that evidence fully justifies the conclusion that there is only one electric fluid. The theory of a single electric fluid is capable of assuming two forms, in which material idio-repulsion is entirely discarded. The one form is that of an original theory adopted by Mr. Kennedy, in the year 1825. It was deduced from a rather complicated fluxionary calculation, by which a beautifully simple result was obtained. An exponential fluxionary equation, involving all the possible powers and simple functions of the electric force, was employed. The result of the calculation was surprisingly simple, namely, that electrical action varies in the inverse ratio of the electric quantity; or, $A \propto \frac{1}{q}$. Let A' represent the attraction of a material corpuscle for electricity, in any given electrical condition, suppose the neutral state, and q the quantity of electricity which that corpuscle then contains. The tendency of two material corpuscles c c' towards each other, may be denoted by T, and is $= 2A'q = A' \times q + A' \times q$. Now, if the electrical quantities of c and c' become each $= x$, the attraction of each of these corpuscles for electricity will become $= \frac{A'q}{x}$, and T will become $= \frac{A'q'}{x} \times x + \frac{A'q}{x} = 2A'q$, as before. That is, the joint tendency of the two corpuscles to mutual approach remains unaltered, so long as their electrical quantities are equal to each other, whatever each of these electrical quantities may be, whether a large quantity, or a small. Suppose next, that the electrical quantity of c becomes $= x$, and that of $c' = y$, then their respective attractions for electricity will be $\frac{A'q}{x}$ and $\frac{A'q}{y}$; and T will be $= \frac{A'q}{x} \times y + \frac{A'q'x}{y}$, or $\frac{A'qy}{x} + \frac{A'qx}{y}$. Now this must be greater than $2A'q$, in every case in which x is unequal to y; for if x is unequal to y, (because A' and q are constant quantities,) $\frac{A'qy}{x}$ must be unequal to $\frac{A'qx}{y}$. If x be greater than y, $\frac{A'qx}{y}$ must be greater than $\frac{A'qy}{x}$. Now $\frac{A'qy}{x} : A'q :: A'q : \frac{A'qx}{y}$. Whence, (Euclid's Elements, Book v. prop. xxv.) $\frac{A'qy}{x} + \frac{A'qx}{y}$ are greater than $2A'q$;* that is, the least possible value of T is $2A'q$;—in common language, the tendency of the two corpuscles to mutual approach, is the least possible when they contain equal quantities of electricity. It follows also, that the more unequal x and y are, the greater must the sum of $\frac{A'qy}{x}$ and $\frac{A'qx}{y}$ be; that is, the more the electrical quantities of the two corpuscles differ, the greater is their tendency to mutual approach. The phenomena of electrical attraction, repulsion, and quiescence, may be explained on this theory, in a manner perfectly satisfactory, and exceedingly easy.

1. Quiescence.

Case 1.—*Let A B C D be four small balls, equal to each other, homogeneous, equidistant in the same straight line, and all in the neutral electrical state.*

* 8 : 4 :: 4 : 2. Now, 8 + 2 exceeds 4 + 4. Again, 3 : 9 :: 9 : 27; but 3+27 exceed 9+9.

Then, according to Coulomb's law, the mutual attractions of A B C D will be the same in amount as if all the matter in each, and all the electricity in each, were collected at their very centres. Now, it is evident, that since the four balls are equal, homogeneous, and in the neutral state, they must all contain equal quantities of electricity, and must attract electricity with equal forces. A will attract B's electricity with as much force as that with which it attracts C's electricity. Also, B will attract A's electricity and D's, with equal forces; consequently, A and B would be exactly balanced between C and D; for the air around the balls could have no effect upon them, because the opposing actions of its various parts completely balance each other, so long as it remains throughout in the neutral state;—thus take, on any side of A, and at any distance from A, a small portion, k, of the surrounding air; then opposite to k, and equidistant from A in the same straight line, there is an equal space or portion of air l, whose action must completely balance the action of k; for A must attract k's electricity and l's with equal forces. Also k and l must attract A's electricity with equal forces. Hence it appears, that the influence of the air around the balls may be left out of consideration, so long as that air remains in the neutral state. We have only to take into account the mutual actions of the balls A B C and D, and their electricity. These actions are perfectly equilibrated, and therefore the bodies must remain at rest.

Case 2.—*Let A be electrified plus, while C B D remain in the neutral state.*

Then it is evident, that as C and B contain equal quantities of electricity, they must attract A's electricity with forces precisely equal: and A must attract B's electricity and C's with forces precisely equal; consequently, A and B must still remain at rest.

Case 3.—*Let A be electrified minus, while B remains in the neutral state.*

Then since, as in the last case, C and B contain equal quantities of electricity, the forces which urge A towards B must be exactly balanced by the forces which urge A towards C: consequently, A and B must still remain at rest.

2. Attraction.

Let A be positively, and B negatively, electrified.

Then the material corpuscles in A and C, B and D, will tend towards each other with more than the minimum force, because these corpuscles contain *unequal* electrical quantities. But the material corpuscles in A and B will tend to each other with greater forces than do the corpuscles in A and C, B and D. Thus A will be urged towards C, and B will be urged towards D, with augmented forces. But the forces which urge A towards B will be augmented in a higher ratio, because the electrical quantities of their material corpuscles are more unequal than the electrical quantities of the material particles in A and C, B and D. In other words, + tends to — more forcibly than + tends to =, or than — tends to =; that is, the corpuscles which are electrified *oppositely*, tend more forcibly towards each other than towards the corpuscles which are in the neutral state. Thus A and B will acquire an increased tendency to separate, and they will also acquire an increased tendency to approach each other; but the tendency to approach augments in a higher ratio than the tendency to recede; and the air around the bodies can have no efficient action on them. Hence A and B must move towards each other, if left free to obey the electric forces.

3. Repulsion.

Case 1.—*Let A and B be alike electrified plus.*

Then the mutual attraction of their corpuscles will still be the *minimum*, because their electrical quantities, though altered, are *equal* among themselves. Hence the tendency of A and B to mutual approach will be the minimum tendency corresponding to $2A'q$. But the tendency to mutual approach possessed by A and C, B and D, must be greater than the minimum, because the electrical quantities of their corpuscles are *unequal*. Hence the bodies A and B, if free to move, must recede,—A being drawn

towards C, and B towards D, by the superior attraction.

Case 2.—*Let A and B be alike electrified minus.*

Then their mutual attraction will be the *minimum*, because their electrical quantities are *equal*. But the mutual attraction of A and C, B and D, will be more than the minimum, because their electrical quantities are *unequal*. Thus, the forces which tend to separate A and B are greater than the forces which tend to bring them towards each other. Hence, A and B, if free to move, must mutually recede, being drawn asunder by the superior attractive forces which urge A towards C, and B towards D.

Corollary.—The greater the electrical intensity, the greater must the electric action of small electrified bodies be.

Observation.—In large electrified bodies, inductive influence, by affecting the distribution of their electricity, will modify their attractive and repulsive tendencies—or, to speak with greater correctness, their tendencies to mutual approach, or mutual recession.

Hitherto, the case of four *homogeneous* balls has been considered;—but now let the exterior balls C and D be removed, the spaces they have been occupying will not be left empty: these spaces will be filled with air. Now, air contains electricity: air obeys the same electric laws, and exerts the same electrical influences, as other sorts of ponderable matter do. If, as is generally believed, electricity is distributed among bodies, not according to specific affinities, but simply in proportion to their volumes and surfaces,—then the electricity in the *equivalent* spaces C and D must be the same in quantity with the electricity in A and B; and thus these aërial spaces or portions will be quite as influential on the bodies A and B, as the solid bodies were which they have replaced. Further, the air in C and D will be virtually *immoveable;* because when one particle of air leaves either space, C or D, another particle of air must enter in A's room, and perform the same functions. Thus it appears that it is quite possible to dispense with material idio-repulsion; and that a theory beautifully simple is capable of explaining all the ordinary electrical phenomena. The Franklinian theory, when disencumbered of material idio-repulsion, and improved by introducing the influence of the equivalent spaces, possesses greater capabilities than the illustrious American electrician was aware of, being able to explain the recession of negatively electrified bodies, and the quiescence of unelectrified bodies. This Mr. Kennedy showed by algebraic formulæ and arithmetical calculations. Mr. K. added, that the phenomena of excitation by compression afforded *experimenta crucis*, from which it appeared, that the Franklinian theory, though far more flexile and useful than it is commonly thought, cannot be the true theory. These phenomena supported Mr. Kennedy's own electrical theory. He added, that by supposing certain diversities to obtain in the electrical *capacity* of material corpuscles, the phenomena of cohesion, adhesion, capillary attraction, chemical affinity, electro-chemical decomposition, might be explained.

Mr. Bryson asked Mr. Kennedy, whether force did not involve repulsion; and if so, why he denied the existence of electric repulsion, and yet admitted electric force? Mr. Kennedy replied, that he conceived he might admit electric attractive force, and yet deny the existence of repulsive force, when he showed that the phenomena were the result of attraction alone.

Sir David Brewster then communicated a brief account of the camera obscura, and other apparatus used in making Daguerréotype drawings; and exhibited an apparatus made for himself by Mr. Davidson, of Edinburgh, who has effected some improvements on the process. He likewise explained the method of producing Photogenic Drawings on paper, as invented by Mr. Fox Talbot, and exhibited a series of drawings executed by Mr. Talbot himself.

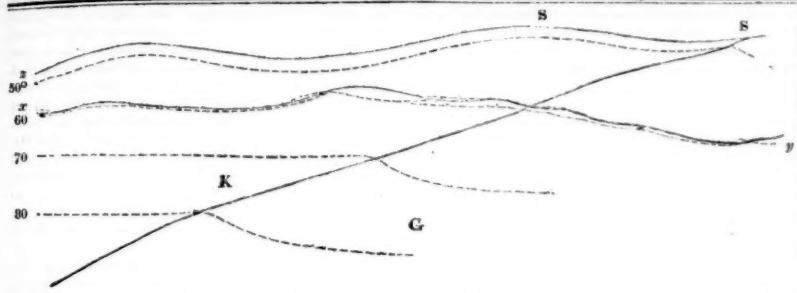
A paper was read by Dr. Forbes 'On the mean apsidal angle of the moon's orbit.' By limiting the terms in the expression of the integral equation to the first four, viz. those depending on cos. $c\,\theta - a$, cos. $2\,\theta - 2\,m\,\theta + 2\,\beta$ cos. $2\,\theta - 2\,m\,\theta + 2\,\beta - c\theta + a$ or the evection, and cos. $2\,\theta - 2\,m\,\theta + 2\,\beta + c\,\theta - a$, he derived the number expressing the ratio of the apsidal angle to the whole circle, and found it to be .00843; the result given in the 'Mécanique Céleste,' by La Place, being the same. A decided influence was ascribed to the inclination of the moon's orbit to the ecliptic, and the corrections that require to be made for it; also, to the value due to h, or the space described by the radius vector in the unit of time, in the disturbed orbit, compared with the same in the simple elliptic theory. The circumstance that this quantity may be so easily determined presents a beautiful evidence of the law of gravitation, and of the truth of the Newtonian theory, and may be of material importance in the theory of the moon.

The Astronomer Royal observed that this was a subject upon which he had written, and to which he had paid considerable attention; but of course he could not at the moment form a definite opinion on the merits of Dr. Forbes's method. The history of the investigation connected with this angle was very curious; many had attempted the problem, most of those with whom he was acquainted on wrong principles, and yet all had come to the correct result. The method of substitutions adopted by Dr. Forbes he did not think well calculated to lead to very correct results. Plana's method, which he described, he considered preferable. He then showed how the change of position of the orbit caused the line of the apsids to change its position, but this change was not constantly in the same direction: when the disturbing body was in the direction of the line of the apsids, the motion was direct; when in a position transverse to that, it retrograded; hence, its direct motion caused it to follow the sun, and therefore to hang longer in that position, but its retrograde motion caused it to fall back from the sun, and therefore to separate faster; and, consequently, it continued a shorter time retrograde than direct, and the direct motion, on the whole, was the prevailing motion. It was not Newton's method to give the calculation by which he arrived at his results, unless they perfectly pleased him; in this instance Dr. Forbes was quite correct in saying that in the eleventh section of the 'Principia' he had given this angle only one-half of its mean value; but a passage occurs in the third book, in which it is obvious he was in possession of a means of correctly calculating the true angle; for when speaking of the orbits of the satellites of Jupiter, he refers to his previous determination, and says, this angle must be increased in the proportion of 5 : 9, or nearly as 1 : 2, "ob causam quare hic exponere non vacat." This is the true proportion, and therefore he must have been in possession of some means of arriving at it.—Dr. Forbes said, that his object was only to determine the mean motion of the line of the apsids, and hence his method rejected all the circular functions in the expression.

Mr. Fox's Report 'On Subterranean Temperature.'—Early in the year 1815, my friend, Joel Lean, stated to me his conviction that the high temperature observed in our mines existed in the earth itself, increasing with the depth; and shortly afterwards his brother, Thomas Lean, at our joint request, kindly made many experiments in Huel Abraham copper-mine, of which he was the manager, in order to test the correctness of this view. The result obtained by him tended to confirm it very unequivocally; and so did another series, made in the same year, at my request, in Dolcoath Mine, by John Rule, jun., one of the superintendents. Many other individuals have since obligingly carried on similar observations for me in different mines, all showing that the subterranean temperature increases in some proportion to the depth of the stratum. The ratio of its increase at different depths, and the causes which exercise a greater or less influence upon it, have, however, been hitherto undecided. I have already endeavoured to show that the rate of increase is not so considerable at deeper excavations as at those which are shallower; and the tables subjoined will exhibit this point in a satisfactory manner, as far, at least, as the results obtained in some of the mines of Cornwall and Devonshire, which I have published from time to time, may be considered an authority. The first table contains results obtained in the deepest galleries and accessible parts of mines, a few only excepted; in which cases the experiments were made with great care in the rock at superior levels, and at a distance from other excavations. Some of the reasons for preferring the former to the generality of results derived from the upper parts of mines, have been stated on previous occasions; and they appear to be so obvious, as to render repetition needless. The second table shows the temperature observed in the rocks, rubbish, water, and air in various mines at different depths, but not in the lowest excavations. It will not, therefore, perhaps, be considered to possess much value, beyond what is derived from the great number of the results, and the probability that the mean which they indicate may be an approximation to the truth. The figures only are given, without any details, and are to be found in my papers in the Transactions of the Cornwall Geological Society, and in the *Lond. and Edinb. Phil. Mag.* (xi. 1837). Many of the observations, even in the first table, may perhaps now be considered very imperfect, having been obtained when the inquiry was in its infancy. The method which I have more recently adopted, of having the bulbs of different thermometers buried at different depths at the bottom of a mine, appears to be as unexceptionable as the circumstances of the case will admit of; but, in fact, I have always considered, that the best experiments on subterranean temperature, influenced as it is by so many disturbing and conflicting causes, can be regarded as affording only approximations to the truth, and in a greater or less degree, in proportion as they are more or less numerous, and made in different localities. I have taken the mean temperature at 50° Fahr.; and it is, I think, clearly not more than this in the mining districts of Cornwall and Devon, judging from the experiments I have instituted on the temperature of the ground at three different stations, at the depth of 3 feet, which give a mean of 49°.86 for the year, at a mean elevation of about 240 feet above the level of the sea, and also from the meteorological registers kept in this neighbourhood, some of which appear in the Cornwall Polytechnic Society's Reports. Moreover, the water accumulated in some stopped mines of inconsiderable depth has been found at 51° and 52°. In estimating the ratios of increase of temperature, I have assumed the depth of 10 fathoms under the surface as *zero*, or the point where the mean temperature of the rock or country is equivalent to that of the climate: possibly it may occur at a rather less depth than this on an average, but doubtless it differs much in this respect in different localities, according to the nature of the rocks, and the greater or less degree in which they are intersected by faults and veins. Upon the whole, I am of opinion that I do not much err, in supposing a temperature of 50° to exist at 10 fathoms deep in our mining districts, most of which are at a considerable height above the sea level.—Here follow the tables of observations, and the report proceeds to state the results. The first table gives a tolerably consistent rate of increase of temperature, as it respects the rock or rubbish, and the water and air. The mean is 18°.09 at 110 fathoms deep, or 100 fathoms below zero; 28°.09, or 10° more, at 210 fathoms deep, or 100 fathoms deeper—the augmented temperature of the first 100 fathoms being to that of the second, in round numbers, as 18 : 10. In the last columns are included all the results obtained in the rock, water, and air, with the exception of a few, which seem to be in unusual excess; and they give in round numbers—

A temperature of 60° at	60 ft. below the surface, or 50 below zero.	
70° at 132	do.	122 do.
80° at 246	do.	236 do.
Being an increase of 10° at	50 feet below zero.	
10° more at	72 feet deeper.	
10° more at	114 feet still deeper.	

The second table exhibits similar increments of temperature at intervals of about 37, 78, and 126 fathoms of descent. The comparative augmentation of temperature at small depths exhibited in this table, and its reduction at greater depths, may perhaps be more or less attributed to the ascent of warm air and vapour from the deeper galleries of the mines, and the descent of colder currents into these parts. The diagram on next page illustrates the first table: The upper line z represents the surface of a given district, the diagonal line the junction of granite and killas, the upper dotted line the isothermal zone of 50°, which recedes a little from the more elevated parts of the ground, and approximates nearer to the surface line, where the latter is depressed. The other dotted lines indicate the mean intervals, at which, according to the first table, there appears to be a progressive augmentation of 10° Fahr.; but the tor-



tuous line *x y* might more properly indicate the very irregular depths at which a given amount of temperature exists even in the same neighbourhood. The isothermal lines are represented as having a small inclination downwards as they pass from the killas into the granite, to illustrate the inferior temperature of the latter. The amount of this difference is undoubtedly very variable in different localities, and sometimes little or nothing. Mr. Fox, in his earlier papers on subterranean temperature, noticed the fact, although he had not ascertained the extent of the difference; nor had he considered it so high upon the whole as Mr. Henwood had done, but he has investigated this point, Mr. Fox says, more fully than himself. The intervals between the isothermal lines seem to vary much in different places; but Mr. Fox thinks it will be found to be a general fact, that the temperature increases less rapidly in descending in proportion to the depth of the stations in the mines. The conducting power of the rocks cannot, then, he apprehends, be the immediate or proximate cause of these phenomena at the greatest depths hitherto attained; nor is it to be supposed that a depth where the heat is transmitted through this medium only will ever be reached by man, since the temperature at the bottom of some deep mines is already almost as great as is compatible with active operations. Mr. Fox long since suggested, that the differences found to exist in the increments of temperature in different places and strata are powerfully caused by the circulation of water under the surface; and the tendency of warm water to ascend through cooler portions of that fluid, is quite consistent with the fact of the ratio of increase being greater at small than at considerable depths. Wherever the facilities are the greatest for the ascent of these currents,—such, for instance, as exist in veins, faults, or fissures in the strata, and frequently at the junction of different rocks,—there the subterranean temperature is usually found in excess, or above the mean. Thus, the more numerous fissures and cracks in killas than in granite, by permitting water to infiltrate, and then the water warmed below to ascend in the colder water, will raise the temperature of the killas above that of the more compact granite at the same depth. Mr. Fox illustrates this position by examples taken from the tables, and adds, that the effect is, he apprehends, promoted by the agency of electricity, which is in active operation in metalliferous veins, the feeblest voltaic arrangement being capable of transmitting water, especially if it contain saline ingredients, through the most tenacious clay, in any direction, horizontally or vertically. He concludes the report with the expression of a hope, that the ratio of the increase of subterranean temperature may be more fully investigated, not only in this country, but also in others, where the climate and zero of temperature may be most dissimilar, and suggests, that a request from the British Association to the mining companies of this country and of America would probably be attended with the happiest effect. The Russian, Swedish, and other governments he thinks might also be readily engaged in the undertaking.

The PRESIDENT noticed the agreement of the results with those of other observers, and stated, that the apparent discrepancy in the high rate of increase near the surface, and the diminution of that rate, as he descended, observed by Mr. Fox, arose from his having taken his point of commencement at 10 fathoms, or 60 feet, beneath the surface, whereas he should have reckoned from the very surface, for the *mean* temperature of the surface and of the air at the surface were the same.

'On the Temperature of the Earth in the deep Mines in the neighbourhood of Manchester,' by Mr. Eaton Hodgkinson.

Mr. Hodgkinson having, some years ago, received from Prof. Phillips four thermometers belonging to the Association, got, through the kindness of the proprietors of the following pits, and other parties connected with them, experiments made upon the temperature of the earth in each of them:—The salt-rock pit, 112 yards deep, belonging to the Marston Salt Company, near Northwich, Cheshire; the Haydock Colliery, 201 yards deep, near to Warrington; the Broad Oak Coal-mine, 329 yards deep, near to Oldham. In the latter pit, a thermometer placed in a hole three feet deep, bored in "metal," and closed at the aperture, was examined weekly by Mr. Swain for twelve months, the temperature varying from 57° to 58½° Fahr.—it being lowest from the beginning of February to the middle of May, and highest in September and October to the middle of November. The experiments above mentioned were made in 1837 and 1838, and the results mentioned at the Birmingham meeting; but the Broad Oak pit having been increased in depth since that time, a thermometer was inserted in it, in a hole bored in metal, as before. It was in a place 408 yards deep, and indicated a temperature of 61°, remaining nearly constant for twelve months. Mr. Fitzgerald being recently engaged in sinking a deep coal-pit at Pendleton, two miles from Manchester, Mr. Hodgkinson conceived this to be a favourable opportunity for getting additional information on the subject of subterranean temperature, and, on his application to the proprietor, the engineer (Mr. Ray) readily made for him, during the sinking of the pit, and afterwards in the workings, the experiments of which the results are below. At 418 yards from the surface, the temperature, in a hole from three to four feet deep, bored in dry rock, was 66°; at 450 yards deep it was 67°; and at 480 yards it was 69°. In the workings at 461 and 471 yards deep, it was in both cases 65°. The mean temperature of the air at Manchester, according to Dr. Dalton's experiments, is 48° Fahr.; and, as the pits above mentioned are not very far from Manchester, the mean temperature of the earth at the surface of each of them may be considered as 48°. With that supposition, the distance sunk for each degree of Fahrenheit would be as below:—

In the rock pit	32 yards.		
Haydock coal-pit.....	20	,,	
Broad Oak pit.....	33.7, 31.4	32.5 ,,	= mean.
Pendleton pit (shaft)..	23.2, 23.7, 22.8	23.2 ,,	= mean.
Ditto (in workings)	27.1, 27.7	27.4 ,,	= mean.

The mean from the whole being 27 yards for each degree of temperature.

The PRESIDENT remarked, that Mr. Hodgkinson's results gave the rate of increase of temperature greater near the surface, and then decreasing, which did not agree with the results of other observers: this, he conceived, arose from nearly the same cause as that already remarked upon when Mr. Fox's report was under consideration. Mr. Hodgkinson commenced to reckon his descents or depths, not from the surface, but from the plane of invariable temperature, which in these latitudes was not far from 60 feet.—Prof. FORBES illustrated simply by a diagram how this caused the rate of increase at first to be too high, and then to diminish. He then alluded to the frozen soil of Siberia, gave a description of it, and said, that it had been sunk through to a depth of 382 feet without being penetrated—that is, without reaching a temperature of 32°, although the temperature of the surface was not below 18°. In this case, the rate of increase was rapid.

Prof. FORBES's Report 'On the Temperature and Conducting Power of different Strata.'

In this report, he wished to give the results of the observations made at Edinburgh during the year 1839, upon thermometers sunk at depths of 3, 6, 12, and 24 French feet into trap rock, pure loose sand, and sandstone. The details for the years 1837 and 1838 were already laid before the British Association at Birmingham—[see *Athenæum*, No. 620, p. 688]. In order to render the report of the results for 1839 intelligible, Prof. Forbes went over nearly the same explanatory matter as that which is already published in the report referred to. He then exhibited the curves derived from the three years' observations, remarked upon their wonderful agreement, and gave, in a tabular form, the results for the three years, which were as follows:—

Values of A (A being the constant in the formula given in the report referred to).

	In trap.	In sand.	In sandstone.
For 1837	1.164	1.176	1.076
1838	1.173	1.217	1.114
1839	1.086	1.102	1.049

Values of B (the other constant).

	In trap.	In sand.	In sandstone.
For 1837	.0545	.0440	.0316
1838	.0641	.0517	.0345
1839	.0516	.0498	.0305

Variation reduced to 0.01° Centigrade.

	In trap.	In sand.	In sandstone.
For 1837	58.1 feet.	72.2 feet.	27.3 feet.
1838	49.3	61.8	91
1839	59.2	63.5	100

Velocity of propagation for one foot of depth

	In trap.	In sand.	In sandstone.
In 1837	7.5 days.	7.1 days.	4.9 days.
1838	6.8	6.8	3.6
1839	7.8	7.2	4.6

The Secretary read two Reports from Mr. Baily, one on the reduction of the stars in the Histoire Céleste, and the other on the extension of the Catalogue of the Royal Astronomical Society; they were as follows:

The Committee appointed to superintend the reduction of the stars in the Histoire Céleste, report, that about 33,000 stars have been already reduced, the cost of which has been about 412*l.*, exclusive of about 52*l.* for printing skeleton forms, for the use of the computer. They further report, that there are about 16,000 more stars to be reduced, the cost of which will be about 200*l.* more. As the original grant will not cover the whole of this expense (there being only about 35*l.* remaining out of that grant,) the Committee suggest the propriety of extending the grant for the ensuing year to the 200*l.* above mentioned, which they trust will complete the work.

August 25, 1840. FRANCIS BAILY.

The Committee appointed to superintend the extension of the Royal Astronomical Society's Catalogue of Stars, report, that the work is in considerable progress, and that it will probably be completed before the next meeting of the British Association in 1841. They further report, that 360*l.* have been already paid for computations, and about 70*l.* for printing and other expenses, making a total of about 430*l.*, out of the original grant for 500*l.* As this balance of 70*l.* will not be sufficient to complete the work, the Committee request that it may be extended to 150*l.*, which they hope will meet every expense.

Sir DAVID BREWSTER read a paper 'On the Phenomena and Cause of *Muscæ volitantes*.'

As this paper was illustrated with several drawings, and contained minute experimental details, it is not easy to give a popular account of it. The following are the principal results:—1. That in persons of all ages, and with the most perfect eyes, transparent filaments or tubes exist in the vitreous humour, and at different distances from the retina. 2. That these filaments float in the vitreous humour, moving about with the motion of the head. 3. That these filaments are seen by means of their shadows on the retina, and are most distinctly visible in divergent light, their shadows being bounded by fringes produced by diffraction or inflexion. 4. That the real muscæ, resembling flies, are knots tied, as it were, on these filaments, and arising from sudden jerks or motions of the head, which cause the long floating filaments to overlap and run into knots. 5. By making experiments with the head in all positions, and determining the limits of the motions of the muscæ; by measuring their apparent magnitude, and producing double

images of them by means of two centres of divergent light, the author was able to determine their exact place in the vitreous humour; and to ascertain the important fact that the vitreous humour in the living human eye is contained in cells of limited magnitude which prevent any bodies which they contain from passing into any of the adjacent cells.—Sir David Brewster concluded with the following observations: "I have dwelt thus long on the subject of *Muscæ volitantes*, not only because it is an entirely new one, but also on account of its practical utility. Mr. Mackenzie informs us, 'that few symptoms prove so alarming to persons of a nervous habit or constitution as *Muscæ volitantes*, and that they immediately suppose that they are about to lose their sight by cataract or amaurosis. The details which I have submitted to you prove that the *Muscæ volitantes* have no connexion with either of those diseases, and are altogether harmless. This valuable result has been deduced from a recondite property of divergent light, which has only been developed in our own day, and which seems to have no bearing whatever of an utilitarian character; and this is but one of numerous proofs which the progress of knowledge is daily accumulating, that the most abstract and apparently transcendental truths in physical science will, sooner or later, add their tribute to supply human wants, and alleviate human sufferings. Nor has science performed one of the least important of her functions, when she enables us either in our own case or in that of others, to dispel those anxieties and fears which are the necessary offspring of ignorance and error.'"

Sir David Brewster read a notice entitled, 'On the line of visible direction along the axis of Vision.' In Mons. D'Alembert's Memoir 'On different questions in Optics,' published in his *Opuscules mathematiques*, tom. i., he has maintained the singular opinion that distant objects, like the fixed stars, when viewed directly with both eyes, are not seen in their true direction, that is, neither in the direction of the rays which they send to the eye nor of the line (coincident with it) drawn from the point of incidence on the retina through the centre of visible direction. The author pointed out the fallacy in D'Alembert's reasoning, and thus established in opposition to the opinion of that distinguished philosopher, the law of visible direction which he had explained at the Newcastle Meeting.—[See *Athen.* No. 568.]

Dr. Reade exhibited an experiment, with an instrument which he called an Iriscope. A piece of black polished glass was rubbed over in part with a solution of Castile soap; as soon as it was dry, the soap was polished off with a glove, until, as far as appearances were concerned, the one part of the glass was as clean as the other. He then blew his breath on the plate through a tube about half an inch in bore, and instantly the most vivid rings of colours (resembling Nobili's) were exhibited where the breath condensed on the part of the glass which had been previously soaped; while, on the other part, the condensed breath exhibited simply the usual dead grey colour.

TUESDAY.

Section B.—CHEMISTRY AND MINERALOGY.

'On the Minerals in the Neighbourhood of Glasgow,' by Prof. Thomas Thomson.

The neighbourhood of Glasgow, including Leadhills, is not inferior to Cornwall in the richness of its mineral species. The mines at Leadhills began to be wrought during the reign of James IV., under the name of gold mines; and it is said by Boethius, that he extracted from them a considerable treasure. In the time of James V. Leadhills was a lead mine as at present, and is particularly described by Agricola in his celebrated work 'De re metallica.' Besides galena, no fewer than nine species of lead ore occur at Leadhills. These are—

1. Sulphate of lead.
2. Carbonate of lead, analyzed by Klaproth.
3. Cupreo-sulphate of lead, described by Mr. Sowerby.
4. Sulphato-carbonate of lead, analyzed by Mr. Brooke in 1820.
5. Sulphato-tricarbonate of lead, Ditto.
6. Phosphate of lead, analyzed by Dr. T. Thomson.
7. Cupreo-sulphato-carbonate of lead, analyzed by Mr. Brooke in 1820.
8. Chromo-phosphate of lead, analyzed by Dr. T. Thomson.
9. Vanadiate of lead, analyzed by Dr. R. D. Thomson in 1834.

Leadhills also affords fine specimens of blende, or sulphuret of zinc, and also of silicate of zinc. The Kilpatrick hills, which bound the valley of the Clyde, from the Stockey moor to Dumbarton, and also the corresponding but lower range on the south side of the valley, are composed of various trap rocks, among which amygdaloid is pretty common. This rock is so termed from its containing numerous almond-shaped cavities interspersed through it. These cavities are filled up by crystallized minerals, most of them zeolites. These are—

1. Stelite.—2. Thomsonite.—3. Natrolite.—4. Mesolite.—5. Scolezite.—6. Lomonite.—7. Chabazite.—8. Analcime.—9. Cluthalite.—10. Stilbite.—11. Heulandite.—12. Harmotome, or Cross stone.—13. Carbonate of magnesia, at Bishoptown.—14. Dihydrous peroxide of iron, at Gourock.—15. Sulphate of barytes.—16. Calcareous spar.—17. Fibrous sulphate of lime.—18. Arragonite.—19. Wollastonite.—20. Prasolite.—21. Fluor spar.—22. Prehnite.—23. Augite.—24. Amphibole.—25. Felspar.—26. Labradorite, one of the constituents of a variety of greenstone at Campsie Glen and at Gleniffer.—27. Mica.—28. Epidote.—29. Steatite.—30. Iron pyrites.—31. Carbonate of iron.—32. Grey ore of manganese.—33. Kilpatrick quartz.—34. Sulphuret of cadmium; rare, and lately discovered occurring along with Prehnite at Bishoptown. Single crystals are now selling at 10*d.* each.

'On a method of separating, by Filtration, the Coagulable Lymph from Liquid Human Blood,' by Prof. Andrew Buchanan.

Dr. Buchanan showed several specimens of coagulable lymph separated by filtration from human blood while yet liquid, immediately after issuing from the vein. He thought the process for obtaining it might not be without interest to those engaged in the prosecution of animal chemistry, as it enabled them to obtain the fibrin of the blood in a perfectly pure state; and he knew no other process by which it could be so procured. The result obtained was also interesting, as serving to illustrate the constitution of the blood itself. It showed the coagulum to be formed not by the mere aggregation of the red particles, but that, according to the views of Berzelius, and many physiologists in our own country, the red particles were altogether passive in the act of coagulation, and were merely mechanically enveloped by the coagulable lymph, which existed in the liquid state in the blood as it circulates in the blood vessels. Dr. Buchanan's process consisted in mingling together one part of liquid blood just drawn from the vein with six or eight parts of perfectly pure serum obtained from blood drawn the day before. Certain precautions are indispensable to the success of the experiment. If the blood be at once mixed with the whole of the serum, the red particles of the blood pass through the filtering paper along with the lymph and serum. Advantage must be taken of the superior specific gravity of the red particles in order to separate them. For this purpose, the liquid blood mixed with only a small quantity of serum is cautiously added to the rest of the serum placed in the funnel. The red particles subside, while the lymph mingles with the serum, and filtrates perfectly pure through the layer of red particles at the bottom, just as we filter any liquid through a stratum of sand. The mutual action of serum and liquid blood has not been sufficiently investigated. It has, indeed, been long known to physiologists that the serum of the blood has no action upon the red particles, and they have employed it in their examination of the red particles under the microscope. They do not, however, appear to have pursued the inquiry farther, to ascertain what becomes of the "liquor sanguinis," as it has been called, the transparent part of the blood as seen by the microscope, and of the fibrin which it holds in solution. To ascertain this, various proportions of serum and liquid blood were mingled together. When equal measures of the liquids were used, or two or three parts of serum to one of blood, the coagulum formed was merely more voluminous and looser in texture than usual, but not otherwise altered in appearance. When, however, six or eight parts of serum are employed, the coagulation is much retarded, the red particles form a dense layer at the bottom of the vessel, while the whole fibrin coagulates alone, forming a voluminous translucent mass,—an artificial "buffy coat," as it would be called by physicians. In this way, however, the fibrin is not obtained pure, but has more or less of a red tinge, particularly in the lower half of the mass, owing to the red particles not having completely subsided before the coagulation took place. The results corresponded to what the author had anticipated, but he had no expectation of being able to obtain the fibrin perfectly pure by filtration, as Müller had done with respect to the blood of the frog. Of the four specimens exhibited by Dr. Buchanan, one consisted of the red particles gradually deposited, while the fibrinous coagulum, with only a slight tinge of red at its lower part, floated above; the other three consisted of fibrin separated by the filter, one of the masses floating in serum, the other two in water. These masses are very like calf-foot jelly in appearance. They are of a cellular texture, and their yellow colour is owing to the serum contained in their meshes, but by ablution with water they become of a pure white colour.

'On a Mode of detecting Minute Portions of Arsenic,' by Dr. Clark, of Aberdeen.

This mode had been applied by the author to the detection of arsenic in commercial specimens of the metals tin and zinc. Grain tin, made in Cornwall, contains arsenic, which seems to be the occasion of the peculiar smell of the hydrogen evolved from that metal by the action of acids. All the specimens of commercial zinc that the author had happened to try were found to contain arsenic. Pure muriatic acid, diluted with distilled acid, is poured upon the metal, and the hydrogen evolved is passed first through a solution of nitrate of lead, and next through a solution of nitrate of silver. Nitrate of lead seems not acted upon by arseniuretted hydrogen,—at least, when in very small proportion; but were any sulphur present in the metal, sulphuretted hydrogen would be evolved in consequence, and the solution of nitrate of lead would be blackened, which, however, the author did not observe ever to occur. But nitrate of silver seems immediately to be acted upon by most minute portions of arseniuretted hydrogen. A bluish black precipitate is formed, which, to judge from a qualitative analysis, appears to be an arseniuret of silver. This bluish black precipitate may be collected with remarkable facility, from its falling readily from the solution, which it leaves perfectly clear. Heated in a small tube, so that the matter heated comes into contact with the air, the bluish black precipitate evolves arsenious acid, which, by the liquid tests, may be further satisfactorily recognized. Antimony produces a similar precipitate, so that the mere appearance of the precipitate is not enough, without the production and recognition, by the usual methods, of the arsenious acid. By a few evident modifications, this method may be applied to medico-legal investigations.

Dr. R. D. Thomson had found that the electrical method of Mr. E. Davy was inapplicable, in consequence of the deposition of a black matter from the zinc, which he had considered to be bitumen. Dr. Clark has, however, proved it to be arsenic.

Mr. M'Gregor read a paper containing experiments, performed by him while resident in the Royal Infirmary of Glasgow, with a view to ascertain whether the quantity of carbonic acid thrown off from the lungs differed in health and disease. The mean per cent. in health he found to be 3.5 per cent., a quantity which very nearly corresponds with that of Dr. Thomson, of Glasgow, and Dr. Apjohn, of Dublin; that found by the former being 3.72 as a mean ultimate result, while that of the latter was 3.6. In the eruptive stages of small-pox, measles, and scarlet fever, the amount of carbonic acid evolved from the lungs was considerably increased; in the former to from 6 to 8 per cent., in the two latter to from 4 to 5 per cent. During the aggress and climax of these diseases, the per-centage of carbonic acid showed the above increase; while in proportion as convalescence established itself, and the skin reassumed its normal appearance, the per-centage of carbonic acid gradually diminished. Ten cases of each of the above specified disease were so examined. In chronic skin disease an augmentation was also observed; and in one case of ichthyosis, the mean per-centage amounted to 7.2 per cent. The scaliness in that case was universal, and ultimately proved fatal. In diabetes mellitus, a disease in which the aliment is converted into sugar, and eliminated in the form of urea and sugar, no normal aberration could be detected, the carbon in that case being eliminated in the form of sugar and uren.

'On the Constitution and Products of the Distillation of Fat Bodies,' by Prof. Redtenbacher and Dr. Varrentrapp.

The object of this paper was to show that the composition of the fat acids has hitherto been erroneously

stated. A variety of acids were subjected to examination, such as stearic, margaric, oleic, and sebacic acid. Margaric and stearic acids were shown to possess the same radical,—the former being the higher, the latter the lower oxide of it. This radical has the formula of C_{34} H_{33}, and may be represented by the symbol $\overline{Ma}$: thus stearic acid is $2\ \overline{Ma}+5\ O$; whilst margaric acid is $1\ \overline{Ma}+3\ O$. They thus resemble sulphuric and hyposulphuric acids. Margaric acid is one of the products of the distillation of stearic acid; the oxidation of the latter also causes the formation of the former. Oleic acid was analyzed by these gentlemen, having been obtained in a pure state. The results were principally numerical, and are stated in Liebig's Journal for last July or August, to which we refer for further detail regarding this communication.

'On a New Mode of estimating Nitrogen in Organic Analysis,' by Prof. Bunsen.

The qualitative methods at present employed for the analysis of azotized bodies were shown to be defective, for it is impossible to employ these processes when the nitrogen and the carbon are in small proportion to each other. Prof. Bunsen's process consists in introducing the substance to be analyzed, after having mixed it with oxide of copper, into a glass tube. A few slips of metallic copper are then added, and the tube is fixed to Dobereiner's apparatus for producing hydrogen. This gas is conducted through it until all the atmospheric air is expelled, giving the tube a rotatory motion at the same time, in order to dislodge any air which might be retained between the particles of the oxide of copper. The tube is now hermetically sealed, and introduced into an iron vessel filled with gypsum. The gypsum must be still moist when the tube is introduced, in order that it may be firmly wedged. Thus prepared, it is introduced into the common oven used for organic analysis, and surrounded with red-hot coals. If the tube be of strong green glass it never bursts. When the combustion is completed, the tube is placed below a graduated glass receiver standing over mercury, and the point cut off. The gas which had a pressure of several atmospheres now rushes into the jar. The carbonic acid is absorbed by a ball of hydrated potash, which is introduced into it, and the remaining gas must be nitrogen, for all the hydrogen must have been converted into water by the oxygen of the oxide of copper. The results obtained by this method agree with theory to the second and often to the third decimal place.

'On a New Salt obtained from Iodine and Caustic Soda,' by Prof. Fred. Penny.

While examining the action of iodine on carbonate of soda, a salt was obtained, which crystallized in regular six-sided prisms, and which gave by analysis sodium, iodine, and oxygen, in proportions not corresponding to any known compound of these elements. The same salt was also prepared by saturating a solution of caustic soda with iodine, and allowing the solution to evaporate spontaneously. At first, this salt was thought to be the same as that described by Mitscherlich in his Elements of Chemistry, and to which he gives the following composition $Na\,I+Na\,O$, $I\,O_5+H\,O_{20}$; but the analysis gave very different results. Prof. Penny gives the following characters of this salt:—It is white and inodorous, has a sharp, saline taste, crystallizes in short six-sided prisms, is soluble in cold and hot water, and is decomposed by alcohol into iodate of soda and iodide of sodium. It effloresces by exposure to the air, and is very readily decomposed by heat; water in abundance is first evolved, and then oxygen with a trace of iodine. Its solution is perfectly neutral to test papers, gives a pale lemon yellow precipitate with acetate of lead, yellowish white with nitrate of silver, and a fine bright yellow with pernitrate of mercury. It is not affected by solution of starch, but instantly decomposed with the precipitation of iodine by nitric, sulphuric, acetic, and hydrochloric acids. The latter acid in excess converts it wholly into chloride of potassium. He detailed a remarkable circumstance attending the formation of this salt from iodine and caustic soda. When the solution is evaporated spontaneously, long prismatic crystals of iodate of soda deposit; but as the evaporation continues, these crystals are re-dissolved, and are replaced by those of the new salt. In one experiment this change was very striking. The solution on Saturday night had deposited an abundance of fine crystals of iodate of soda, but on Monday all these had disappeared, and a crop of the new salt had crystallized. The prior deposition of iodate of soda generally occurs in the preparation of this salt; and from other experiments of the author, it seems necessary that there should be excess of iodide of sodium present in the solution, and that the solution should be strong, in order that the salt may form. When this salt is dissolved in water, and the solution evaporated spontaneously, crystals of iodate of soda deposit, but very few of the new salt will form. The salt may also be procured by pouring a saturated solution of iodide of sodium on crystals of iodate of soda, and setting them aside for some days. The crystals will be dissolved and be replaced by crystals of the new salt. Prof. Penny then gave the details of his analysis of this salt, and the following formula, as agreeing best with his results:—$Na_5\ I_5\ O_{12}+38\ H\ O$; or regarding it as a compound of iodate and iodide, it may be thus represented:—$3\ Na\ I+2\ Na\ O\ I\ O_5+38\ H\ O$. According to this view, it is the sesqui-iodide of iodate of soda.

Prof. Johnston on Resins.—In this paper the author drew attention to the following facts, apparently established by a table of analytical results, which he exhibited, and has had printed:—1. That the resins differ from each other in the quantity of oxygen they contain. 2. That those in which the atoms of oxygen is the same, the hydrogen may vary, and that this is another cause of difference in the properties of the resins. 3. That in all the resins hitherto carefully analyzed, the number of atoms of carbon is constant. 4. That the resins, as a natural family, may be represented by a general formula containing two variables. 5. That the known resins divide themselves into two groups, possessing unlike chemical and physical properties. That of one of these groups, colophony, may be considered as the type, and that it is represented by $C_{40}\ H_{32}\pm x\ O\ y$; that gamboge, or dragon's blood, may be considered as the type of the other group, which is represented by $C_{40}\ H_{24}\pm x\ O\ y$.

Prof. Johnston on some Varieties of Peat.—The author exhibited some varieties of peat from the moss near Paisley, which he stated were illustrative of a transition from the comparatively fresh and vegetable matter to a substance resembling coal, but which he affirmed to be ulmic acid. The author stated, that the same substance might be obtained from peat by digesting it in ammonia, and afterwards precipitating the brown solution by an acid; while, on the other hand, caustic potash extracts another acid, which he proposed to term *humic acid*.

Dr. Playfair stated, that an elaborate set of experiments had been made in Liebig's laboratory last winter regarding the nature of humic or ulmic acid. But the results of these had not been at all satisfactory, for the acid varies in composition from whatever source it may be procured. Thus Malaguti, Sprengel, Peligot, and Stein, state the proportion of carbon nearly 10 per cent. different from each other. Even the same acid changes in composition by keeping. The reason appears to be, that it is vegetable matter in a state of decay, so that it is not surprising that results so inconsistent should be obtained by different analysts. The secretions from diseased elms might probably be a definite ulmic acid, but there is no reason for concluding that this is the substance existing in peat. Liebig has shown that peat probably proceeds from the decomposition of woody fibre; and this is occasioned by the oxygen of the air. The compounds resulting from this action can always be expressed in atomic proportions; so that when we find that all the chemists who have examined humic acid have obtained different results, we may reasonably conclude that no definite compound exists. There could be no doubt of the accuracy of the analysis of Prof. Johnston, but until the same acid was found in other peats and other substances, it would be dangerous to consider it as a definite body.

Section C.—Geology and Physical Geography.

'On the occurrence of two species of Shells of the genus Conus, in the Lias or inferior Oolite, near Caen, in Normandy,' by Charles Lyell, Esq.

Fossil shells of Lamarck's family "Enroulées," abound in many tertiary formations, but scarcely any examples are recorded of their occurrence in older strata. The six genera comprised in this family are Ovula, Cypræa, Terebellum, Ancillaria, Oliva, and Conus. Four of these appear never yet to have been found either in the chalk, or any older rock. Of Cypræa, one species has been discovered in the upper chalk of Faxöe, in Denmark; and M. Dujardin obtained from the chalk near Tours a cone which he has called *C. tuberculatus*. Two other species of this genus, purporting to come from the lias near Caen, were seen lately (June, 1840) by Mr. Lyell, in the private collection of Prof. Deslongchamps and M. Tesson, of that city. A brief notice had been previously given of their discovery, in a report of a meeting held in 1837, by the Linnæan Society of Normandy. To satisfy himself of the correctness of the alleged geological position of these cones, Mr. Lyell visited, in company with M. Deslongchamps, one of the localities, called Fontaine-Etoupe-Four, about six miles south of Caen. He found there a stratified limestone containing ammonites, belemnites, pleurotomariæ, with other mollusca, and crinoideæ, resting unconformably in horizontal strata, on highly inclined quartzite and talcose schists of the transition epoch. Many deep rents occurring in the fundamental rock are filled with the limestone, and in these situations, shells in great abundance, together with broken pieces of quartzite, are united into a breccia by a calcareous cement. Most of the cones have been found in these rents, and the matrix in which they occur, constitutes the oldest portion of the incumbent or fossilliferous formation. In regard to the age of this deposit, some of the shells, as *Ammonites planicosta* and *A. Bucklandi*, occur in the lias of England; others are met with in our alum-shale, and inferior oolite. The specimens collected by the author, or which were presented to him by M. Deslongchamps, have been examined by Mr. Lonsdale, of the Geological Society of London, who, judging by this evidence, considers the formation to be either an upper member of the lias, or to be intermediate between the lias and inferior oolite. M. Alcide d'Orbigny has also collected forty or fifty species of fossils from the limestone of the same place; and he refers them to the upper lias, although a great variety of the shells are new, and some do not even belong to any genera hitherto established. The stone in which the cones are imbedded, is of a pale brown ferruginous colour, like ordinary inferior oolite, but precisely resembling, according to Mr. Lonsdale, the gritty *lias* or "corngrit" of Radstock. Some of the cones were first discovered by M. Deslongchamps, and M. Tesson soon afterwards obtained the most perfect specimens, of which last drawings were made by M. Deslongchamps, and presented to Mr. Lyell for publication. The originals have also been examined by Mr. George Sowerby, and they seem to be all referable to two very distinct species, one of which has been named *Conus concavus*, from the spire being so depressed, that the summit is concave. For the second, the name of *Conus cadonensis* is proposed. It approaches nearest to *C. antediluvianus*, varying considerably in the height of the spire in different individuals.

Mr. Griffith read a paper 'On the Yellow Sandstone of the Carboniferous Limestone series of Ireland.'—This sandstone does not occur everywhere with the limestone, but only occasionally,—often alternating with it, although in a low part of the series. In fact, he conceives it to be the lowest member of the carboniferous series, and not to belong to the old red sandstone which it immediately overlies. He had described it at the Newcastle meeting as yellowish quartz rock, but has now adopted the name of yellow sandstone. It often contains remains of calamites, and other vegetables. Mr. G. exhibited a section of part of the country on the north side of Donegal Bay, where the old red sandstone rests on mica-slate, and is overlaid by the lower members of the coal measures, beginning with the yellow sandstone, underlying limestone, and shale. In fact, this lower series might be termed the yellow sandstone series, being in the very lowest part of the carboniferous. At Lough Esk, near Donegal, thin seams of coal have been found. A similar section of the rocks near Ballyshannon was also shown. This sandstone has been found in the county of Monaghan, near the border of the graywacke, and is largely developed in

Tyrone and Londonderry, and is found in Mayo and Longford. That it is of the same age as the lower limestone is proved by the alternations, and its often containing similar fossils. In the southern parts of Ireland are many localities of this sandstone. He conceives it proves that there are two distinct limestones of the carboniferous series in Ireland; and that there is a difference in the organic remains, as north of Kinsale the beds contain goniatites, which distinguish the lower limestone. Euomphali are also most generally found in the lower bed. Mr. G. mentioned likewise several newly-discovered localities of Silurian rocks in Ireland, in addition to the one described by Major Portlock, at Pomeroy, in Tyrone. They had been found in the county of Louth; where north of Slane, they contain graptolites. In the county of Kerry they are well developed, especially near Dingle, where they seem to graduate into old red sandstone.

His Grace the Duke of Argyll mentioned the discovery of copper ore on his estate in Argyllshire in a vein of quartz and clay slate, in a mica slate district, and near granite, and stated his intention of having it worked: and he also mentioned the discovery of copper in the island of Islay. He exhibited several specimens of the ore, also of marble from Tiree and Iona.—Mr. Milne stated, that on the property of Lord Breadalbane there had been discovered lead, copper, cobalt, arsenical pyrites, sulphuret of molybdena, &c. He mentioned some curious phenomena of the directions of the veins. There are two sets of joints, one N.E. to S.W., containing lead, and the other N. and S., inclosing copper: granite occurs in the vicinity. He mentioned also, as worthy of remark, that in Strath Earn, near the granite of the earthquake district mentioned on the day before, lead was found; likewise near the granite of Loch Dhu.—Mr. De la Beche remarked, that the direction of veins holds good in districts of limited extent, and is useful in exploring them. In Cornwall this is exemplified, although the veins are there in a different direction. A rich copper ore is not sufficient to make a good copper mine, as other conditions are required to render it lucrative. The proximity to granite is a general case with respect to copper mines, although lead is often found at a distance from that rock.

M. Agassiz made a communication on the subject of Glaciers and Boulders in Switzerland. He particularly drew attention to facts relative to the manner of the movements of the glaciers, which he attributes to the continual introduction of water into all their minutest fissures, which, in freezing, continually expands the mass. The effects of the movement, produced by this expansion, upon the rocks beneath the ice, are very remarkable. The bases of the glaciers, and the sides of the valleys which contain them, are always polished and scratched. The fragments of the rocks that fall upon the glaciers are accumulated in longitudinal ridges on the sides of the ice, by the effects of the unequal movement of its middle and lateral masses. The result is longitudinal deposits of stony detritus, which are called *morains*; and as the glaciers are continually pressed forwards, and often in hot summers melted back at their lower extremity, it results, that the polished surfaces, occasioned by friction on the bottom and sides, are left uncovered, and that the *morains*, or curvilinear ridges of gravel, remain upon the rocks formerly covered by the ice, so that we can discover, by the polished surfaces and the *morains*, the extent to which the glaciers have heretofore existed, much beyond the limits they now occupy in the Alpine valleys. It even appears to result from the *facts* mentioned by Prof. Agassiz, that enormous masses of ice have, at a former period, covered the great valley of Switzerland, together with the whole chain of the Jura, the sides of which, facing the Alps, are also polished, and interspersed with angular erratic rocks, resembling the boulders in the *morains*; but so far different, that the masses of ice, not being there confined between two sides of a valley, their movements were in some respects different—the boulders not being connected in continuous ridges, but dispersed singly over the Jura at different levels. Prof. Agassiz conceives that at a certain epoch all the north of Europe, and also the north of Asia and America, were covered with a mass of ice, in which the elephants and other mammalia found in the frozen mud and gravel of the arctic regions, were imbeded at the time of their destruction. The author thinks, that when this immense mass of ice began quickly to melt, the currents of water that resulted, transported and deposited the masses of irregularly rounded boulders and gravel which fill the bottoms of the valleys; innumerable boulders having at the same time been transported, together with mud and gravel, upon the masses of the glaciers then set afloat. Prof. Agassiz announced, that these facts are explained at length in the work which he has just published, 'Études sur les Glaciers de la Suisse,' illustrated by plates, which was laid before the Section. Prof. Agassiz is also inclined to suppose that glaciers have been spread over Scotland, and have everywhere produced similar results. If we understood him rightly, he means to follow up his valuable researches in the Highlands of Scotland during his stay in this country, and that he confidently expects to find evidence of such glaciers having existed, particularly around Ben Nevis.

Mr. Lyell remarked, that the explanation regarding the union of the lateral *morains* into the central, was a complete explanation of the phenomena, but thought the presumed extent of glaciers was doubtful. He stated, that Mr. Darwin observed glaciers in Chili, on mountains not half the elevation of Mont Blanc. The polished surface of rocks may be remarked in many parts of the world. They had been long since noticed in Scotland, and he himself had observed them in Sweden, where perhaps they might be explained by the stranding of icebergs in narrow fiords, where they rubbed against rocks.—Mr. Mallet urged, as an objection against the theory, that the motion would be greatest when the alternation was least; and that the opinion, that there was no water beneath the glacier, above the perpetual snow line, was erroneous.—M. Agassiz admitted, that the causes which had been assigned by Mr. Mallet [see Report of Brit. Association,] were *veræ causæ*, but, in his judgment, were not the great cause.—Mr. Mallet observed, that he had not said that hydrostatic pressure was the sole cause for the motion of precession, but co-existent with those assigned by Hutton, Playfair, &c., namely, weight, and alternate freezing and thawing.—Mr. De la Beche said, there was a difficulty respecting *morains*. In the elevation of land from the sea, there must be lines of gravel, as on beaches, which might be confounded with the other.—Mr. Murchison alluded to the erratic blocks observed by Buteling in Lapland, originating from a centre, some of them going even towards the north. He alluded to Mr. Agassiz's idea of Europe being at one period encased in ice. This he thinks not borne out, especially in Russia, where the blocks must have been deposited under a sea. In England, we observe in the superficial drift, marine shells of existing species.

Mr. Smith, of Jordan Hill, made some observations on the Geology of Madeira, describing the various kinds of lava, and some deposits, containing shells, which he considered of the newer Pleiocene era.

Mr. Ibbetson exhibited a number of drawings of fossils by the Daguerréotype process, in which he had made use of the oxyhydrogen microscope, which had magnified the object in a manner highly advantageous for examination.

'On a Pleistocene Tract in the Isle of Man, and the relations of its Fauna to that of the neighbouring sea,' by Mr. Edward Forbes.

Mr. Forbes stated, that he did not appear as a geologist, but as a zoologist, desirous of contributing to the progress of geology. In the course of his investigations, as a member of the Dredging Committee, he was frequently led to compare the present state of the sea with that of the land bordering it, and the results were such as mutually illustrated zoology and geology. The northernmost part of the Isle of Man, coloured white in Mr. Greenough's map, is composed of a great bed of pleistocene sand, and marl, called by the people *red marl*, to distinguish it from the white marl, which fills up basins in the former, and in which the bones of the fossil elk are found. The red marl is marine, the white marl fresh-water. The pleistocene tract so composed, extends from the slate mountains to the sea, terminating in high cliffs of sand and clay. The portion immediately bordering the mountains is composed chiefly of sand, and in it there are no organic remains; that farthest from the mountain is red marl, and the remains of shells are found in beds in it. These shells are associated together exactly as those are, which at present exist in the neighbouring sea. There is even an exact correspondence between the elevated tertiary tract and the present sea bottom. The latter, for from two to four miles from the shore, is composed of sand with groups of boulders, to which Laminariæ are attached, thinly scattered in places. Beyond the sand, commences a great bed of living shells on a clayey or gravelly bottom, exactly corresponding with the position and nature of that part of the marl in which the shells are found. In the marl, the shells most abundant and characteristic are Nuculæ, so also in the shell bank; but there is this important difference, that the species are not identical. The *Nucula oblonga* characterizes the fossil bed, the *Nucula margaritacea* the recent; but the shells not characteristic are identical as species. The pleistocene bed appears to correspond exactly with that of Cheshire and the Clyde. Near Ramsay it is bordered for about one mile by a triangular tract of gravel and clay. This tract was formed within the memory of man, in consequence of changing the course of Sulby river. It is most interesting in a geological point of view, as it presents all the appearance of a pleistocene clay-bed, containing shells now extinct on the Manx shores, for the diversion of the course of the stream has caused the destruction of *Listera compressa* and *Tellina solidula*, two shells not now found alive on that shore. Mr. Forbes concluded by illustrating the importance of the dredging researches now going on, by the circumstance of that Committee having this summer settled the question of the identity of Phytocrinus with Comatula; the Sub-committee engaged in dredging on the coast of Ireland, having proved the former animal to be the young of the latter.

Mr. Jeffreys detailed an experiment he had made on a very great scale, to decide the question, whether siliceous matter could be dissolved largely by water, or, what is the same thing, by its vapour. This experiment formed the subject of a paper which was read some months ago before the Royal Society, and by the experiment a solution of more than two hundred weight of silica was effected in steam, at a heat exceeding that of fused cast-iron. The steam was not under pressure, but was conducted into a large kiln used for stone pottery. The silica was not only dissolved, but carried away in the vapour, and some pounds weight of it were deposited, from the vapour, before it issued from the kiln, like a hoar frost, upon some articles in the kiln, where the temperature was not above a red heat.

Mr. Yates mentioned that fossil foot-marks had been discovered in the sandstone at Rathbone Street, Liverpool.

MONDAY.

SECTION D.—ZOOLOGY AND BOTANY.

Dr. Fleming in the chair.

A paper 'On the Alpaca,' was read by Mr. W. Danson.—He observed that since the meeting at Birmingham about twenty of these animals had been imported into Liverpool. The alpaca is remarkable for having extraordinarily long wool, samples of which were shown, the staples measuring from twenty to twenty-four inches in length. This wool is naturally free from grease, in which respect it differs materially from the sheep, attributable to its not perspiring through the skin, and consequently not requiring the artificial protection of smearing with tar and other substances injurious to the wool, as far as the manufacture is concerned, and in shearing, the animal requires no washing preparatory to the operation. Mr. Danson particularly pointed out the hardy character of the alpaca, from the circumstance of its flourishing immediately under the line of perpetual snow, in the mountains of the Andes (Peru); and a not less singular or valuable fact, that of their peculiar coat of silky wool proving a complete protection against an atmosphere at all times excessively humid, and against the deluging rain that continues to fall upwards of four months in the year, rendering them, in his opinion, well suited to the Grampian and other mountainous districts of Scotland. The animal is not only capable of undergoing great fatigue, but likewise lives on mountain herbage, little better than a kind of withered grass, and in times of scarcity has been sustained several days without water, taking only a handful of maize. Their flesh is considered equal to venison, being commonly eaten by the Peruvians, who state the slaughter of them for food to be equal to four millions annually.

The importations of the alpaca wool, Mr. Danson stated to be, in 1839, one million pounds, and to have increased within the last year to three millions. In answer to questions, Mr. Danson stated, that half the flock was of a white colour, the other half black: the white wool took the dye in a most satisfactory manner. An alpaca can be shipped at Peru for 25*s.*, but the cost of keep was great in coming over, and they fetched from 10*l.* to 30*l.* when landed at Liverpool. By sending pressed hay from this country they might be brought over at a much less expense.

Mr. Selby inquired the age at which they produced wool, and it was stated that at the age of twelve months the wool was longer than that of the sheep in England.—Dr. Hamilton, who had resided for some time in Peru and Mexico, knew these animals well. The alpaca was a distinct species from the llama and vicugña. The llama was a valuable animal of burden. The wool of the alpaca was undoubtedly very valuable, but he feared it could not be imported successfully. He had never eaten alpaca flesh, but he had that of the llama, and it was most disagreeable. The price of a llama was 4*s.*, that of a sheep or an alpaca, in Peru, was 2*s.* The climate of this country, he feared, was not adapted to this animal. It was very different from that of Peru, where for three parts of the year the atmosphere was peculiarly dry, a great contrast to the moist climate of Britain. It was also very hot in the districts where the alpaca lived.—Mr. Babington remarked, that in addition to the difference of climate between this country and the Andes, we must take into consideration the difference of soil. In the Andes there is a hard dry soil, whilst in the mountainous districts of Scotland we had a damp soft boggy soil. On looking at the foot of the alpaca he found that it was much more extended and slender than that of the sheep; it possessed such a foot as adapted it for its native mountains, but if placed on a moist soil it might be liable to foot-rot, which would effectually prevent its introduction.—Dr. M'Donald thought the question, as to whether they could live in this country had been proved, but it was evident they did not *thrive*. But another question still occurred: would an animal bearing a fine wool on the Andes, supposing that it lived, bear the same quality of wool on the Grampians?—A Gentleman, who had seen the animals at Oban three years ago, stated, that they were not in a state of disease, nor had they foot-rot.—Dr. Hamilton stated that the animals at Oban were llamas, for he had shipped them from Peru in 1833.

Mr. Hugh Strickland 'On the true method of discovering the Natural System in Zoology and Botany.'—The object of the essay was to show that the true system of nature is not to be discovered by any *à priori* or theoretical considerations, but by an inductive process similar to a geographical survey. Assuming the reality and permanence of species, the natural system is defined to be, the arrangement of species according to the degree of their mutual resemblances. These degrees of resemblance are to be estimated by the physiological importance of the points of agreement, combined with their numerical amount, in the objects compared. It is these essential points of agreement which constitute affinity as distinguished from analogy. The method proposed is, to take any one species A, and ask the question, "What are its nearest affinities?" Those other species (one or many) which are closely and equally allied to A, are then to be placed on each side of it. We are then to take one of these latter species, and again ask the same question. By a repetition of this process it would be possible ultimately to survey and construct a map of the whole organic creation. In following out this plan it will be found that species or groups do not form a continuous or linear series, but frequently ramify in various directions. It will be farther found that they do not ramify according to any regular figure or numerical property, but resemble rather the irregular branches of a tree. The irregularity of the details of the natural system is maintained, and we are unable to predict what species or groups may yet remain undiscovered. From this it is inferred that all systems, circular, quinary, dichotomous, &c., are not natural but artificial, and only of use in arranging museums. The author added, 1. That the analogies of the external world, such as the distances of the fixed stars, &c. indicate that amorphous variety, and not geometrical, numerical symmetry, is the prevailing law of nature. 2. That as organic structures are created not for the purpose of being classed in museums, but for the discharge of certain offices in the external world, it follows, that if the conditions of existence, such as soil, climate, locality, &c. be indefinitely various, the forms of animals and plants which are adapted to those conditions must be indefinitely various also.

Mr. Vigors observed, that he had often found those, who set out by disagreeing with others, frequently came to the same conclusions as those from whom they differed. He believed Mr. Strickland differed from others more in words than anything else. The only natural system was the system of the universe, and every arrangement of man was only an artificial attempt at exhibiting affinities of objects in nature. Writers on classification committed an error when they supposed their system was *right*, and all others *wrong*. The author of the paper had referred to geography as affording a perfect example of a natural system: it might be so in the larger divisions of the globe; but the establishment of lines, points, &c. for the distinction of smaller portions, were purely artificial. Those who assumed numbers in the arrangement of the organic kingdom, did so for the sake of convenience; and whether his own classification on the quinary plan, or that of the Chairman, with a dichotomous division, be adopted, the same end was to be obtained,—the arrangement of the living world in the most convenient manner. It was too late now to enter on the developement of any system opposing the author's, but he thought that, in the end to be attained, all would agree.

Dr. Lizars described the Organs of Sense in the Salmon.—After demonstrating the structure of the skin, he showed that the colour of the animal depended not merely on the *rete mucosum*, as in the dark varieties of the human race, but that the superficial fascia exerted a great influence, from its colour and the transparency of the dermis. The *rete mucosum* was a soft gelatinous layer, presenting a number of minute black points, which were very abundant in the dark, but few in the light parts of the skin. The superficial fascia bore the closest resemblance to the rete in the greater part of its extent; but in some situations it exhibited the appearance of adipose tissue. From the arrangement of the nerves, the skin appears far from being highly organized for the function of touch. The same remark applies to the tongue and the sense of taste; first, from the state of the mucous membrane, and secondly, from the small size of the gustatory nerves. The organ of smell was very highly developed. It is contained in an elongated cavity placed in the upper and fore part of each side of the head; leading to each side of which, there are two apertures placed close together, the septum between them serving the purpose of a valve to the anterior; so that water could enter, but could not escape by it. Upon examining the posterior opening with the microscope, and with bright sunshine, a number of minute white filaments, bifurcated at their extremity, were observed: they were supposed to be ciliæ; one or other of their minute extremities was seen bending and extending itself. On the inner wall of the cavity were twelve delicate folds of membrane attached to a slight prominence, and receiving the filaments of the nerve of smell. He supposed the water, loaded with the odoriferous particles, to enter by the anterior orifice, to flow between the olfactory folds, impress the nerve, and escape by the posterior aperture; the ciliæ in the last, producing the current in that direction. In the description of the eye a peculiar thickening of the cornea was pointed out, a short way from the circumference, and more extensive at the lower than at the upper part. The sclerotic coat he found very thin, single, and having a thick strong layer of cartilage extending from near the cornea to within three or four lines of the optic nerve. The ciliary ligament is very soft and delicate. The appearance of an outer and an inner circle in the iris was seen, but no muscular fibres; the delicate membrane described by Jacob on the posterior surface of that body, he found to be reflected from its external circumference to the fore part of the hyaloid membrane, which it accompanied to the capsule of the lens. The choroid membrane, single in front, is double posteriorly, inclosing between its layers the choroid body; which was supposed to consist of erectile tissue, and to enable the eye to adjust itself to vision at different distances. The ciliary processes are wanting. The retina extends from the optic nerve to where the choroid membrane forms a continuity with the iris. The humours are similar to those of other fishes; and, in examining the fibres of the lens with the microscope, the serrated appearance described by Sir David Brewster was seen. The organ of hearing consists of a lower and upper sac, and three semicircular tubes; the sacs are lodged in the interior of the skull, and the tubes connected with the upper, in canals formed partly of bone and partly of cartilage. The interior is filled with fluid; and in each sac there is a dense calcareous mass or otolite; that in the upper being small and rounded, that in the lower large and triangular. The auditory nerve divides into a number of branches distributed to the sacs and canals.

Prof. Agassiz believed he could confirm most of the observations of Dr. Lizars. Besides the dark matter in the rete and fascia, he had observed with a high magnifying power small bodies possessing a metallic lustre, and much smaller than the last, which probably gave the beautiful metallic brightness to the colour of fishes. He had not discovered muscular fibres in the iris, but had observed that the iris possessed the power of contraction.

Prof. Agassiz made a communication to the Section 'On animals found in Red Snow.' He stated that our countryman Shuttleworth had lately demonstrated that besides the *Protococcus nivalis*, the red snow contained several species of Infusoria. He had, however, now to lay before the Section the result of his own observations, from which he had come to the conclusion that the red snow was altogether an animal production, and that the so-called *Protococcus nivalis* was the ova of a species of rotiferous animal called by Ehrenberg *Philodina roseola*. This animalcule he had found dead in the red snow, and occurring abundantly in ditches in the neighbourhood, at the bottom of which its ova produced a red deposit. Under the microscope the coloured ova in the ovaries could be distinctly seen. He had also seen the infusoria described by Shuttleworth. Drawings of the *Philodina roseola*, and the other animalcula of the red snow, were exhibited to the Section. The Professor also announced the discovery of a new species of Podura, in the clefts of the glaciers of the Alps. Specimens and drawings of this insect were also exhibited.

Dr. W. Arnott believed that more than one species of Protococcus, and perhaps other genera, produced the red snow, as that brought by Capt. Parry from the Pole was very different from that which occurred on the Alps and the mountains of Scotland: it might be animal in one district and vegetable in another.—Dr. Lankester observed, that the rose-coloured sediments which he had described as found at Askern, he at first supposed to originate with the *Philodina roseola*, as that animalcule was in great abundance in ponds near the sediment; but a further examination had proved the sediment to have another origin. Amongst the animalcula figured by Prof. Agassiz, was one which closely resembled that producing the red sediment at Askern. He had mostly found the lower forms of plants in connexion with animals, and *vice versâ;* and it was probably a question for further investigation, whether there was not a vegetable matter existing which was the source of nutriment to animals in the red snow.—Mr. Forbes observed, that if the Protococcus in one place was of animal origin, the inference must be drawn that all that tribe of so-called plants had the same origin. He put the question as to whether the red inside of the Philodina might not arise from the animal feeding on the Protococcus?—Prof. Agassiz observed, that the colour of the Philodina depended entirely on the ovaries, and that the stomach could be seen distinctly passing down between them; therefore the colour could not arise from anything the animal had eaten. It would, however, sometimes devour its own ova.

TUESDAY.

Section E.—MEDICAL SCIENCE.

Dr. Charles W. Bell read a brief notice of 'Bouten d'Alleppe and Baghdad boil in the East,' which he described as a severe ulcerative disease, leaving unsightly permanent scars, from which all classes suffer—but not contagious. The most remarkable peculiarity is, that it never terminates sooner

than six or twelve months. The disease lasting the former period is thought to have some specific character, and is denominated the female, to distinguish it from the usual form, which lasts the year, and is called the male. It never attacks a second time, and the general health suffers little. It commences by a small pimple, which scales, and is constantly renewed, each successive renewal being more and more severe; in its advanced stage it is very similar to, and has been taken for, syphilitic rupia; at the termination of the year, during which it increases, it seems suddenly arrested, and the ulcerated parts of the face heal up, leaving scars, which are permanent. The only medicines which appeared to the author to have any effect on the disease, were iodine and hydriodate of potash, with the external application of the citrine ointment.

Dr. J. R. Cormack made some observations on the Effects of Air when injected into the Veins, in which he objected to the theory published by Sir Charles Bell, who ascribes death, when it takes place, to the effect which the air produces on the medulla oblongata. This Dr. Cormack denies, and stated that it requires a large quantity of air to be injected in order to produce death, when, in every instance, the heart was found distended in its right cavities and its functions arrested from this cause. Dr. Cormack communicated some notices of the diseases occurring in Tangier in Barbary, the principal of which are elephantiasis, inguinal hernia and hydrocele, with every form of dropsy. Intermittents are frequent, typhus rare. When cholera broke out, upwards of one-tenth of the native inhabitants perished in a few months; the Moors, being fatalists, took no precautionary measures, whilst of the 300 Christian inhabitants not more than two or three perished.

'On the Anatomy of the Medulla oblongata,' by Dr. John Reid.—The object of this communication was to point out the relative position of the motor and sensitive columns of the spinal chord, as they pass through the medulla oblongata and pons varalli, and the attachment of the different motor and sensiferous nerves to these columns. Dr. Reid produced preparations of the medulla oblongata, to show that the decussation of the pyramidal bodies is formed by the greater, and in some cases nearly the whole, of the fibres constituting each of these eminences passing into the posterior part of the middle column of the opposite side. None of these decussating fibres run into the anterior column of the opposite side, nor is there any decussation in the medulla oblongata; besides, on tracing the column which is connected with the clinary body, and which may be termed the clinary column, we find that as it passes downwards, it approaches closely to the anterior median fissure, immediately below the decussation of the pyramidal columns, and affords attachment to many of the roots of the motor nerves. On tracing this clinary column upwards, it is found to expand over the clinary body, affording origin to the hypoglossal and abducens along its anterior margin and to the parts close along its posterior margin. Part of this column passes upwards to the corpora quadrugemina, affording origin to the smaller root of the 5th and to the trochleator. Dr. Reid also pointed out how the spinal accessory and part of the filaments of the par vagum may be connected with the motor column.

'On the Connexion between the Nervous System and Muscular Contractility,' by Dr. John Reid.

This communication was an extension of that made by Dr. Reid to the Association at Edinburgh. In the former communication facts were adduced to show, that when the contractility of a muscular bundle is exhausted in the cold-blooded animals by the application of galvanism, this property of contractility will again return, though all communication between the central organs of the nervous system and the muscles experimented upon had been cut off, by the complete division of the nerves passing between them. In the present communication it was stated that the same fact had been verified upon the warm-blooded animals. The same experiment has also been four times successfully repeated after section of the nerve upon the posterior extremity of the same frog. Dr. Reid then made some observations, for the purpose of showing that the experiments made by Müller, and adduced by him in opposition to the Hallerian doctrine of contractility, are liable to a known source of fallacy. The disappearance of the contractility witnessed by Müller, in the muscles supplied by the scratic nerve in a rabbit, five weeks after that nerve was divided, was, in all probability, dependent upon the imperfect nutrition consequent upon inaction. Dr. Reid stated that he found the muscles of the limb of a frog retain their contractility and their usual size two months after the section of their nerves, when they were daily exercised by sending slight shocks of galvanism through them.

Prof. Allen Thomson gave an account of some new Observations on the Structure of the Gastro-intestinal Mucous Membrane, and more particularly of the Gastric and Intestinal Glands.—This paper was illustrated by a series of preparations of the gastric and intestinal glands of man, and some of the lower animals. After giving a sketch of the recent progress of the investigation of the structure of the mucous membrane and its glands, and alluding more particularly to the researches of Boyd, Boehm, Bischoff, Purkinje, Henle, Wasmann, and Baly, the author gave a general description of the structure and distribution of the gastric and intestinal glands in the human subject at different ages, and in the following animals, viz. the pig, sheep, and ox, horse, dog, cat, and lion, badger, porpoise. The author then entered into a detail of some observations which he had recently made on the gastric glands, and on the solitary glands of the large intestine, from which he forms the conclusion, that at an early period of life these glands have all the form of closed vesicles, and that as life advances in the early years they gradually become open. The author then stated, that he had frequently observed distinct central apertures in the vesicles composing the glands of Peyer in the pig, sheep, horse, and occasionally, but more rarely, in the adult human subject; never, however, in the child nor young subject. The author stated his opinion that the apertures surrounding the vesicle in the form of a zone, do not lead into the cavity of the vesicle. The author gave a minute description of the structure of these glands, and concluded by calling attention to the three distinct points which formed the subject of his inquiry, viz. 1st, The closed vesicular origin of the gastric glands in the child, and their occasional vesicular structure at a more advanced period of life; 2nd, The closed vesicular condition of the solitary glands of the large intestine at the period of birth, and the occasional occurrence of this condition at a more advanced stage, and 3rd, the occasional open condition of the vesicles of Peyer's glands. He farther adverted to the bearing of these observations on the theory of secretion in general, more particularly that recently offered by Henle, on the probable uses of the intestinal glandular secretions in the economy, and on the changes of these glands in the diseased condition.

Dr. Perry read a paper 'On the circumstances which govern local Inflammatory Action, the effusion of coagulable Lymph, and the formation of Pus as a sequela of disease, accidents, operations,' &c.—He pointed out the phenomena of inflammation, its dependence on nervous energy, and the various opinions held by pathologists on the effusion of coagulable lymph, pus, &c.; he dissented, to a certain degree, from the opinions of Hunter, who deemed pus a *secretion* from the blood: as also from the theory of Gendrin, Carswell, and others, who hold that pus is formed from the fibrine of the blood itself, in consequence of its stagnation: neither of these opinions was considered by the author as satisfactorily explaining the phenomena. The generally admitted fact, that in those weak and strumous, and in those weakened by long confinement in an hospital, severe accidents, operations, difficult parturition, &c., inflammation was more easily set up in the system than in the strong, he considered a point of great importance, as explaining the source of local inflammatory action. It was observed by Dupuytren that of those who died in the Hôtel Dieu, after operations, the majority perished in consequence of inflammation of some internal organ, or of many organs at the same time. This accorded with the experience of the author, as inflammation, purulent depositions, &c., most frequently occurred after adynamic fevers, particularly when the brain and nervous system had suffered severely; as also after other contagious exanthematous fevers (none of which the author considered as inflammatory in the first instance). Tables were exhibited, which showed the result of 155 fatal cases, after fever, from which it appeared that local inflammation, with deposits of pus, &c., occurred in internal organs in a large proportion; and these results, so often fatal, the author stated to be the consequence of a change produced upon the blood and capillary vessels, by the previous shock or over excitement and innervation, and that the rapidity with which those products were formed might be taken as a test of the extent to which such changes in the blood and innervation existed; to remove such state by restoring the equilibrium of the system was the province of the physician.

Dr. Hannay read a notice 'On Pertussis.'—He stated that he purposely omitted the examination of the nature of, and the theories existing in reference to this disease, as his chief object was to bring before the Section a remedy, which he frequently found to be of great efficacy in this affection, viz. the rubbing of the chest with cold water, repeated two or three times in the day with so much activity as to produce a rubefacient effect. This remedy might even be resorted to successfully where bronchites existed. Cases were detailed corroborative of its efficacy.

A paper, by Dr. M'Donald, 'On Mnemonics,' was read by the Secretary.—It consisted of observations on metaphysical science, and an attempt to establish a new arrangement of mental diseases, founded on the structure of the brain found (or supposed to be) affected by inflammation, after death.

The business of the Section then concluded.

MONDAY.

Section G.—MECHANICAL SCIENCE.

Mr. James Milne gave an account of an instrument termed a Gas Regulator, of his invention, by means of which the length of the flames is equalized, notwithstanding the variations of pressure that occur, and a considerable saving in the consumption of gas is effected.

Mr. Coles on Railway Carriages.—Mr. Coles proposes to introduce friction wheels; and that, excepting the first and last carriage in the train, the carriages should run on *two* wheels. He also proposes a step-rail at the curves or bends.

Prof. Gordon on the Turbine Water-wheel.

The fundamental principle upon which the construction of the *Turbine-Fourneyron* is based, is that by which the maximum of useful effect is obtained from a given fall of water, depending on the relative velocity of the water and its recipient, which ought to be such that the water enters the wheel without shock, and quits it again without velocity. A notion of its construction may readily be formed, by supposing an ordinary water-wheel laid on its side, the water being made to enter from the interior of the wheel by the inner circumference of the crown, flowing along the buckets, and escaping at the outer circumference. Then centrifugal force becomes a substitute for the force of gravity. A drawing was here exhibited of a Turbine of about 5 horse power, the fall being 3 feet, and the expenditure of water 20 cubic feet per second. It was explained that the Turbine consists essentially of—1. A reservoir, the bottom of which is divided into radial compartments by curved plates, serving to guide the water to take a particular direction of efflux. 2. A circular sluice, capable of nicety of adjustment. 3. The wheel with curved buckets, on to which, when the sluice was raised, the water entered at every point of the inner circumference, and flowing along the buckets, escaped at every point of the outer circumference. This latter is a characteristic feature in the Turbines of Fourneyron. Reference was made to the principal Turbines erected in France and Germany,—particularly to that at Inval, near Gisors, and those at Müllbach and Moussay, as illustrative of their use for falls varying from 9 inches to 10 feet. And, again, to those at St. Blasier, in the Black Forest, as instances of high falls,—the one being 70½ feet, the other 345 feet; the one expending 5 cubic feet per second, the other 1 cubic foot per second; the one being 56 horse-power, the other very nearly 60 horse-power; the one giving an efficiency of upwards of 70, the other of upwards of 80 per cent. of the theoretical effect. A drawing of the latter was exhibited—full size. It is 14½ inches diameter. Its extreme depth or *breast* is .225 inch, or less than ¼. It makes 2,200 to 2,300 revolutions per minute. It serves a factory,

in which are 8,000 water spindles, 34 fine and 36 coarse carding-engines, 2 cleansers, and other accessories. The conclusions drawn by Morier from his experiments on these wheels with the Brake dynamometer, or friction strap, are these:—1. That Turbines are with equal advantage applicable for high and for low falls. 2. That their net useful effect equals 70 to 78 per cent. of the theoretical effect of the power. 3. That they may work at speeds varying from

$$n=\frac{3.3\ V}{R} \text{ to } n=\frac{5.6\ V}{R}$$

Where n = number of revolutions; V = velocity due to fall; R = extreme radius. The useful effect still not differing notably from the maximum. 4. That they work at very considerable depths under water, the relation of useful to theoretical effect not being thereby much diminished.

Mr. Smith (Deanstown) said, there was much in the principle for very high and very low falls, and for varying falls. The principle had been long applied in Perthshire, but in that part of the country a great velocity is obtained at a great expenditure of power.—Prof. Gordon stated, that for all falls above 50 and below 10 feet, the Turbine is to be preferred.—Mr. Fairbairn: The common water-wheel at Gisors, in France, was made by himself, and comparative trials were made with it against the Turbine. Mr. Fairbairn was quite satisfied, by Arago's experiments and otherwise, that the Turbine is a very important machine, and gives a result of 70 to 75 per cent. of the theoretical effect.—Mr. Smith proposed, that as he had peculiar facilities for experimenting on the subject, he, along with Prof. Gordon and Mr. Fairbairn, should investigate the comparative merits of the Turbine and other water-wheels before the next meeting of the Association.

Mr. Jos. Whitworth on producing True Planes or Surfaces on Metals.

Surface plates were exhibited, intended to illustrate the proper mode of preparing surfaces where great accuracy is required. If one be put upon the other, it will float, until by its weight it has excluded some of the air, when they will adhere together with considerable force. These surfaces were got up without grinding. The only operations performed upon them were those of planing, filing, and scraping. Practically, the excellence of a surface consists in the number and equal distribution of the bearing points; the more numerous these are, and the nearer together, the more perfect is their action. But, if a ground surface be carefully examined, the bearing points will be generally found lying together in irregular masses, with extensive cavities intervening. The cause of this irregularity is evident in the unmanageable nature of the process. The action of the grinding powder is under no control. There are no means for securing its equal diffusion, or for modifying its application with reference to the particular condition of different parts of the surface; while the practical result is, that the mechanic neglects the proper use of the file, knowing that grinding will follow, to efface all evidence either of care or neglect. In various departments of the arts and manufactures, the want of improvement in this respect is already felt. The valves of steam-engines, for example, the tables of printing presses, stereotype plates, slides of all kinds, require a degree of truth much superior to that they now possess, for want of which there is great waste constantly accruing in time, in steam power, in wear and tear, and, above all, in skill misapplied. The improvements so much to be desired will follow upon the discontinuance of grinding. The surface plate and the scraping tool will then come into vogue, and a new field will be opened to the skill of the mechanic. Supposing him to be provided with a true surface plate, he will find no difficulty, after a little practice, in bringing up his work to the required nicety. For this purpose he will find it advantageous to employ a scraping tool made from a three-sided file, and carefully sharpened on a Turkey stone, the use of which must be frequently repeated. A light colouring matter, such as red chalk and oil, being spread over the surface plate, and the work in hand applied thereto, friction will cause the prominent places to be marked, which will instruct the experienced mechanic where and how to operate to the greatest advantage.

Mr. Scott Russell presented the Report of the Committee on the Form of Vessels: the members of this Committee were Sir John Robison, Mr. Smith, (Jordan Hill), and himself.

Since their appointment by the Association, the Committee had been constantly engaged in carrying out the various investigations committed to their charge; and it had been their earnest desire to discharge their duties in such a manner as conclusively to settle the many important practical questions in naval architecture which were matters of uncertainty and dispute, especially in reference to steam navigation. The importance of precise knowledge in constructing a mercantile navy, ships of war, and steam vessels, was reckoned so great, that in almost all civilized kingdoms experiments had been undertaken at the national expense, and Italy, Spain, Sweden, and France had obtained by those means a very superior knowledge of the principles of the construction of ships. In this country the labours of individuals had supplied the only experiments of this nature; and it was matter of regret, that these were not of such a description as to furnish the ship-builder with any certain foundation for rules of art. The new demand upon the invention of the naval architect by the introduction of steam power, had also contributed much to augment the disparity which already subsisted between the data of experimental hydrodynamics and the demands of the practical builder of ships. It had also been thought not improbable, that certain singular phenomena in hydrodynamics, recently discovered, might considerably modify the views hitherto entertained of the nature of fluid resistance; and the Association had, therefore, resolved on the appointment of this Committee, for the purpose of giving this subject a thorough and searching examination. The first subject of concern with the Committee, was the mechanism by which to conduct experiments on a scale sufficiently large to render the results of practical value, and at the same time sufficiently manageable to free the experiments, as far as possible, from elements foreign to the immediate subject of examination. It was desirable to obtain, for experiment, a force capable of moving the vessels subjected to experiment, through the water with an uniform force and velocity, capable of being continued for a considerable interval of time over a considerable length of space. All the forms of apparatus hitherto adopted for the purpose of experiment, were examined with the view of adopting the best. None of them appeared fully to answer the end in view, and it became necessary to invent another and better apparatus for giving motion to the vessels. This had been found: a simple contrivance of Mr. Russell's had been adopted, by which a force, perfectly uniform, could be applied without inconvenience throughout any given space, free from the usual errors of friction, rigidity, &c., which had become interwoven with the results of former experiments. This apparatus he regarded as an engine of experiment so important to the future acquisition of knowledge of the resistance of fluids, that he was desirous to communicate it to the distinguished men around him taking an interest in the subject, in order that if it met their approbation, they might avail themselves of it in future investigation. He then proceeded to give a description, with illustrative drawings, of an apparatus by which experiments were made of from a small scale up to 100 feet in length, over a sheet of water from 100 feet to half a mile or a mile in length. For each scale of experiment, strings, cords, and ropes of various thickness were employed; and for the most delicate experiments, a slender Indian fibre, brought home by Sir John Robison, had been found most useful. Two chronometers by Robert, of Paris, also brought over by Sir John Robison, were employed with great advantage, as observations were obtained which could be depended on within two-tenth parts of a second. The next point to be determined was, the general method of conducting the experimental inquiry, so as to elicit the most valuable truths, and those most apposite to practical art. For this purpose the most eminent ship-builders were consulted, as to the points upon which they most wanted information, and were requested to point out what were the forms of vessel which they would wish to have tried. More than 100 models of vessels of various sizes, from 30 inches to 25 feet in length, had been constructed. These were drawn through the water with various velocities, and at different degrees of immersion, so as to determine the resistance of all the various forms that might be adopted in practice, and enable the builder to adopt the form best suited to his purpose. A large pile of papers, laid on the table, contained the results of the experiments, which were still continued. Of these experiments, different series were conducted with very various objects. One class regarded the transverse sections of ships; another the water-lines of the bow; another the water-lines of the stern; another the form of ribband-line and of buttock-line; another class, the place of greatest breadth, and so on. From these experiments, it resulted that vessels might be made fuller than usual at some points and finer in others, with great advantage. A peculiar class of lines, called by Mr. Russell "wave lines," appeared best adapted for high velocities both in smooth water and at sea. It also appeared, that the manner in which the particles were displaced by a moving body, and replaced themselves after its passage, was very different from what was generally supposed. There also appeared to be three different conditions of fluid motion and resistance, accompanied with distinct characteristic phenomena: motion slower than that of the wave—motion on the wave—motion on wings of water. The last occurred only at very high velocities, and when two high and beautiful films of water spread themselves in the air, and carried the boat as on gossamer wings along the surface of the water. Mr. Russell concluded the report, by stating, that the experiments would soon be published, and submitted to the examination of those interested in the subject, in a form better adapted to use than that of verbal description. He hoped it would be found that their experiments had gone far to fill up one of the great desiderata of practical science.

Sir John Robison stated, that the whole merit of imagining and conducting the experiments belonged to Mr. Russell.—Mr. Arch. Smith made some observations, disputing the mathematical accuracy of one of the illustrations used by Mr. Russell.—Mr. Russell explained that the physical effect differed in this instance from the mathematical theory.—The Rev. Mr. Brodie had arrived, by calculation, at nearly the same results as Mr. Russell had by experiment. Mr. Brodie hoped Mr. Russell would direct his attention to the phenomena at very high velocities, such as from 25 to 30 miles an hour. Mr. Brodie's calculations have led to such curious conclusions, as to make him suspect some mistake: he was, therefore, anxious that Mr. Russell should prove their accuracy by his delicate experiments.

Mr. Vignoles 'On the Economy of Railways in respect of Gradients.'

Mr. Vignoles stated that this was another subject, in addition to the former one on timber bridges, selected from a general work on the Principles and Economy of Railways, which he was preparing for publication. Looking to the great cost of railways, he had turned his attention to a comparison of the result of the working of railways, with the price paid for various degrees of perfection. He disclaimed asserting that sharp curves or steep gradients were preferable to straight and level lines, but he would endeavour to show that good practicable lines might be and had been constructed, on which trains sufficient for the traffic and public accommodation could and did move at the same, or nearly the same velocities, and with little, if any, additional expense. On an average, the hitherto ascertained cost of the principal lines might be divided thus:—

Land	10 per cent.
Stations and carrying establishment	20 ,,
Management	10 ,,
Iron	10 ,,
Works of construction proper	50 ,,
	100

though, of course, these items differed considerably in various railways, but in general it might be said that the works of construction constituted one-half of the whole first cost. He left out, on the present occasion, all consideration of the saving of any of the items, except as to the works of construction; though it would not be difficult to show a reduction on these, to the extent of at least one-half. Mr. Vignoles stated that he had analyzed railway expenses of working, and had reduced them to a mileage,—that is, the average expense per mile, per train, as deduced from several years' experience, and observations of various railways under different circumstances, and

with greatly different gradients, some of which lines were enumerated. The result on passenger and light traffic lines was, that the total deductions for expenditure from gross receipts was 3*s.* per mile per train; 2*s.* 6*d.* being the least, and 3*s.* 4*d.* the highest; and that this average seemed to hold good, *irrespective of gradients or curves*. Particular lines might, from local circumstances, differ in detail, but he was satisfied that the following detail was a fair average approximation:—

	s.	*d.*
Daily cost of locomotive power and repairs	1	6
Annual depreciation, sinking fund, and interest on stock, tools, shops, and establishment	0	6
Daily and annual cost in carriage department	0	4
Government duty, office expenses, police, clerks, guards, management, and maintenance of railway	0	8
	3	0

It was not found practicable to distinguish the additional expense, if any, arising from curves or gradients; but as three-fourths of railway expenses were quite independent of these curves, such addition must be small; especially as, on the North Union Railway, a line which had 5 miles out of 22 in the gradients of 1 in 100, or nearly 53 feet per mile, the total expenses were less than on the Grand Junction Railway, and several other lines. Mr. Vignoles then proceeded to illustrate, by diagrams, the mode in which the economy might be made in the works of construction, on what he called the *first system*, by the occasional introduction of inclines of 50 and even 60 feet per mile, if not of too great a length: and again, on the *second system*, by introducing entire series of severe gradients, such as those of 30, 35, and 40 feet. On the first system, he had executed the North Union Railway; and had also thus designed all the government railways to the south and west of England. On the second system was the Bolton and Manchester Railway, by the late Mr. Nimmo, Mr. Macneill's government railway lines to the north districts of Ireland; and that engineer had lately altered the Dublin and Kilkenny, and the Dublin and Drogheda Railways, from better but more expensive gradients, to those on the second system; and Mr. Vignoles was about to apply it to the Dublin and Kingstown Railway; and he had set out the whole extent of the Sheffield and Manchester Railway, for 40 miles, on an average gradient of nearly 40 feet per mile, mixed with occasional inclinations of 1 in 100, and with curves of one-third mile radius. That work was now under execution by Mr. Locke, who had succeeded Mr. Vignoles as engineer, and who fully concurred in the general principles,—which, as also the details, and the introduction of timber viaducts on a large scale for economy, Mr. Nicholas Wood approved. Mr. Gibs had also adopted the same system on the first ten miles eastward of the Newcastle and Carlisle Railway. Mr. Vignoles went on to state, that, on either one or both of these systems, introduced as might be considered most advantageous by the directing engineer, lines of railway might be laid out so as not to exceed 10,000*l.* per mile, being particularly applicable where fertile, populous, and manufacturing districts, or the metropolis, with the extremes of the empire, had to be connected through difficult and unproductive districts. Mr. Vignoles concluded by remarking, that when a continued stream of heavy traffic justified the expense, he saw no reason to vary from the general rules adopted hitherto by engineers for laying out railways, or from his own former opinions and practice. But it was forced on him by daily experience, that, to accommodate the public convenience, the Post Office arrangements, and business in general, it was scarcely once in twenty times that a locomotive engine went out with more than half its load, and in general the engines were only worked up to two-fifths of their full power: he was, therefore, conclusively of opinion, that it was much cheaper to put on additional engines on extraordinary occasions; and on such principles railways should be constructed through the more remote parts of the country, so as to be made in the cheapest possible manner. The possession of all the *profitable* lines of railway by private companies, was likely to throw on the government the *onus* of constructing their lines through such districts, in which case economy was desirable: or, if not to be constructed by the government, then was economy still more important; for Scotland, Ireland, Wales, and western and eastern England would want railways, until some such system as those now promulgated could be brought to bear in the laying out lines of internal communication.

Mr. Roberts entirely concurred with Mr. Vignoles with regard to the gradients and curves, as also to the propriety of the economy of adopting timber bridges, and so reducing the price of conveyance to the public.—Mr. Vignoles, being asked whether, in the gradients of 1 in 100, on the North Union line, any practical danger was to be apprehended, stated that no danger whatever was apprehended; and that, on these gradients of 1 in 100, the trains travelled *down* at full speed, or about forty miles per hour.

OUR WEEKLY GOSSIP.

Our readers will see with regret, from a letter which we have just received from our enterprising countryman, Mr. A. d'Abbadie, that he has met with a serious accident, which has deprived him of the use of one of his eyes; and that he has been compelled to return to Aden, on his way to Europe, for medical advice.—We hear, too, that Helfer, the German botanical traveller, has been murdered by the natives of the Andaman Islands. He was attacked and shot in the head with an arrow when he was collecting specimens.

There is one feature in the *programme* of London music for the early winter, worthy of remark. At the English Opera House, built expressly, and, if we mistake not, expressly licensed for the performance of English opera, Promenade Concerts have been resumed, under Signor Negri and M. Tolbecque. At the Princess's Theatre,—that Paradise of dainty devices, planned and decorated with an especial eye to the comfortable accommodation of the lyric Drama, we have also Promenade Concerts, under Mr. Willy and Mr. Tutton. At Drury Lane—one of two theatres especially protected with a patent for the encouragement of legitimate Tragedy and Comedy—*Concerts d'Hiver*, under Mr. Eliason *and* M. Musard! Now that this supply of overtures and quadrilles, symphonies and *galoppes*, of classical coupled with ball-room music, is overdone, neither the idler who lacks a lounge for his evenings, nor the *fanatico*, will deny. We have, indeed, precedent as well as reason for the belief, that the attraction of such entertainments cannot be permanent, in the transplantation from Paris to London of MM. Jullien and Musard—in the empty benches in the *Rue Vivienne*, and the yawning half-dozen in the *Rue St. Honoré*! Apart, however, from the success or failure of these speculations, their influence upon the state of art in this country is worthy consideration; and while we feel and have expressed our fears that a nascent popular taste may suffer by so disproportionate an alternation of what is frivolous with what is noble, it behoves us to play the part of Mr. Serjeant Eitherside, and state the good in the thing—a good which, we think, may prove comparatively greater for England than for France. This is the encouragement and maintenance of two or three skilful orchestras. Our poverty in this respect is well known: hitherto, when Signor Costa has had the *baton* in his hand, or the Ancients or the Philharmonists have been holding their sessions, it was not possible to provide a worthy performance or an adequate rehearsal for opera or overture elsewhere; and this we assert, not forgetting the high pretensions of the Drury Lane band: whereas, the result of these instrumental performances must be, that when the English Opera House shall keep the promise of its name, and the Princess's Theatre fulfil the design of its builder, and Drury Lane return to its legitimate purpose, each of these establishments will be better manned than it ever has yet been, with instrumentalists, not only individually skilful, but accustomed to control, and to the attention of a public far more searching and critical than in past days, when the overture was merely the "music" played up, no matter how, to silence the expectant gods. In another point of view, these shilling concerts may be useful, as affording our younger musicians an opportunity of trying their works from time to time. The means of gaining a hearing—bestowed, all the world over, but sparingly—are singularly inaccessible with us; and, though we are of opinion that very few geniuses worth keeping alive have been ultimately destroyed by the heart-sickness of hope deferred, still it is sound policy to abridge the time of probation as much as possible.

Our Paris news contains a hint or two on matters connected with the fine arts, in that capital. Busts of Fontanes, Cuvier, and Gouvion-Saint-Cyr, the two former from the chisel of M. Huguenin, and the latter from that of the elder M. Seurre, are added to commissions already given by the Minister of the Interior, for the library of the Chamber of Peers: and the names of M. Louis Boulanger, and M. Riesener, are included in the list of painters employed in the extensive decorations now in progress. M. Peyson de Montpelier, a deaf-and-dumb artist, has also been commissioned to paint the portrait of the Abbé Sicard, to be placed in the museum at Versailles. To these notices we may add, that M. Schmit, Inspector of Religious Monuments, has returned from a tour undertaken by direction of the government, throughout Brittany and Lower Normandy, having visited upwards of sixty sacred edifices and Celtic monuments, and brought away drawings and measurements.

The dramatic world, with our neighbours, is in full activity—nearly all the actors having returned to Paris, from their provincial wanderings. The Renaissance is about to be once more opened, under the direction of M. Antenor Joly, and with the professional aid of Frédérick Lemaitre. At the Academy, the lyrical scena, entitled 'Loyse de Montfort,' which gained the great prize of musical composition, presented at the last sitting of the Academy of Fine Arts, has been produced with success, and is sung by Marié, Dérivis, and Madame Stoltz. The Italian Theatre commenced its season, at the Odéon, with the opera of 'Lucia di Lammermoor, substituted for the 'Puritani,' in consequence of the indisposition of Lablache. Persiani, Tamburini, and Rubini (the latter nearly compelled by illness also to give in) filled the principal parts.

MUSIC AND THE DRAMA

Drury Lane.—The opening of this patent theatre with Promenade Concerts is, if report speaks truly, a measure forced upon the lessee by the extravagant terms demanded by the leading English vocalists. Be this as it may, the *Concerts d'Eté*, with their flowers and fountains, are succeeded by *Concerts d'Hiver*, with statues and gilding, and a more rich and finished style of tent-like draperies inclosing the stage portion of the Promenade. Moreover, M. Musard, of Parisian celebrity as a strict disciplinarian of orchestral forces, and a popular arranger of quadrilles, takes the place of Mr. Eliason; and the military style of his leadership is manifest in the mechanical precision and regimental smartness of the performance, no less than the overwhelming predominance of the brass band.

Errata.—In the Report of Mr. Bentley's paper (*ante*, p. 803), it is said that "he entered into a comparison between the town of Dudley and the city of Worcester, from whence he inferred that education was *not* demonstrably a restraint on crime"—it should have been "was demonstrably a restraint on crime."—In Mr. Osler's table of the force of the wind (p. 768), by an error in transcribing, the autumnal quarter was given for the summer quarter; the whole is therefore reinserted below, to give the correct results:—

	NOON.																							
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Winter Quarter	55	54	49	47	47	48	48	51	50	67	73	82	89	89	85	79	75	65	63	63	63	59	61	57
Spring Quarter	26	28	28	27	29	29	32	41	56	70	80	82	90	89	89	80	81	72	52	45	46	38	33	29
Summer Quarter	16	15	14	11	14	15	18	23	32	34	49	52	56	57	60	57	56	41	33	27	18	17	15	16
Autumn Quarter	19	19	19	19	22	20	18	21	26	40	47	55	58	54	53	44	34	28	27	24	22	20	21	20
Totals	116	116	110	104	112	112	116	136	164	211	249	271	293	289	287	260	246	206	175	159	149	134	130	122

To the Editor of the Athenæum.

SIR,—The extraordinary latitude taken by Mr. Baily compels me to sue for a little more longitude, seeing that, as my Ex-Publisher cannot obtain anything from my pen, he has commenced the publication of my private affairs. The charge of unfairly using my name has, by his own help, been fully established; and his own Advertisement, in your Journal, has proved the justice of the terms applied by me to the transaction. I shall not retort any others, for it is not in the power of Mr. Baily to upset my philosophy:—the notion in Physics, that "Nature abbors a Vacuum," always excepted. As regards my interference,—seeing a very old and kind friend to me—the Public—being lured to the purchase of second-hand novelties,—not in Monmouth Street, but on Cornhill,—common gratitude might or might not induce me to hint that the Eagle over the shop-door was the appropriate sign of an Establishment where old articles "renewed their youth." But when my own name is used in such transactions, all the Bailys, Old or new, cannot controvert my claim to intervene. And, just to assert my "right of remark," I will observe, that on such a system, the Bishop of Exeter himself might some day be advertised as an "eminent contributor" to a Socialist's Oracle, or the Non-Intrusive Dr. Chalmers as a communicant to a Paul Pry Gazette. The papers in the 'Sporting,' for which, according to Mr. Baily, he paid much too large a sum, were written at his own request, and on terms he offered. I remember that they pleased the Editor (Nimrod) and the reviewers, but cannot recollect even thinking of thinking if they would, or could, hit the taste of Mr. Baily. His retrospective review of them is therefore only amusing—especially when in the canine, not wisdom, teeth of his own critique, he has proved, by reproducing one of the papers in the 'Oracle,' that he thought it worthy of a second perusal! On a point of more importance below stairs and amongst menials than anywhere else—the "Who gave warning first?"—my Ex-Publisher is so peculiarly sensitive, that he circumstantially describes an elaborate letter of dismissal—which, however, he must have put into the same post with Sheridan's famous "double letter from Northamptonshire." As a test of veracity, the point is worth deciding,—and here are the facts, from documents now before me. So far from a positive refusal to discontinue the connexion on account of my declining popularity, Mr. Baily formally accepted my terms for a new work on the 13th of last March. On the 18th he attempted to substitute other conditions,—which were peremptorily rejected,—and, moreover, a letter, giving my candid opinion of him as a Publisher and as a man, left him no alternative but to acquiesce and consider the end as the end. *He*, therefore, was the discharged; and, instead of his pretended thunder, went off as follows, with a report ridiculously like pop:—"In your announcement that the terms proposed by me are absolutely declined, I distinctly acquiesce, and, having no further proposal to make, consider the negociation between us for future publications as decidedly at an end."—(Signed,) A. H. Baily. And now to a graver matter. In his desire to wound me, Mr. Baily has thought proper to partly expose my private circumstances,—he has dared to partially raise a veil, which any man of common feeling, and, in his case, of common sense, would have held sacred. The disclosure so rashly and wantonly begun, must, for my own vindication, be completed. The task is eminently painful,—but one pang is spared me. A man who has so long borne his burthen in secret and silence, and with so cheerful a spirit—bear witness for me, my humble works!—will not be confounded with a suppliant for the world's pity or assistance. One who seeks his happiness in the domestic affections, and who has a home and a family circle,—whose favourite pursuits are his profession—can neither be poor nor feel so,—and, least of all, if he happen to have before his eyes some signal example of poverty, nay, utter destitution, of all enjoyments, moral or intellectual. Be it known, then, to the world,—since such is Mr. Baily's *pleasure*—that, self-banished, I have been struggling abroad to retrieve my affairs, and to acquit myself honourably of all claims upon me,—a consummation once quite in the foreground of my prospects, but rendered remote by the sudden breaking up of my health, after a stormy passage to Rotterdam. I can adduce medical testimony that my literary exertions have been fully as great as could be expected under the circumstances of my case: indeed, I will venture to say in my own behalf, that, taking both effusions together, no gentleman alive has written so much Comic and spitten so much blood within six consecutive years. The property thus acquired is at this hour in the hands of the same individual who taunts me with my misfortunes—a taunt, nevertheless, quite delicious, from the intense assurance it gives me that such a person is not my friend. It is true, as he states, that my property was attached; though not "by my creditors," but by *a* creditor—and not "lately," but above four months ago. Two significant mis-statements, which without any of the innocence, have all the weakness of the babe that cannot stand. It is also true, though Mr. Baily never mentions it, that the property was not attached till legal proceedings were commenced to wrest the "heavy stock of my last works" from a Publisher who was no creditor at all. Finally, it is true, that the attachment *was kept secret by Mr. Baily*, although, as a Paid Agent he was undoubtedly bound to communicate the fact to the proprietor! After these disclosures, may I not justly say, that the "Suppressio Veri" afflicts his moral constitution and not mine? I put aside the allusion to the respectable publishers who "got rid of me one after the other," a statement as correct as Mr. Baily's circumstantial account of his own sending me adrift. The present is not a Faction Fight between Authors and Booksellers, and, if it were, most assuredly the respectable publishers would not elect a Champion who not only gives his head but exposes his heart to the severest punishment. The infliction, however, is so like helping a man to commit suicide that I forbear—and besides I want to read over again that chapter in 'Count Robert of Paris,' where the Knight, in the very extremity of his distress, is so brutally set upon by a creature whose chief resemblance to humanity is in his shape.—I am, Yours, &c., THOMAS HOOD.

WORKS PUBLISHED BY W. S. ORR & CO.

AMEN CORNER, PATERNOSTER ROW.

ILLUSTRATED WORKS.

In imp. 8vo. price 1*l.* 11*s.* 6*d.* in cloth, and 1*l.* 18*s.* in morocco,

GREECE: PICTORIAL, DESCRIPTIVE, and HISTORICAL. By CHRISTOPHER WORDSWORTH, D.D. Illustrated by Twenty-six highly-finished Line Engravings on Steel, after Fielding, Creswick, Cox, and Sargent; two Maps of Greece, and upwards of Three Hundred and Fifty highly-finished Engravings, drawn on Wood by Harvey, Sargent, Meissonnier, Paul Huit, Daubigny, Stanley, and Jaques.

In imperial 8vo. price 15*s.* cloth lettered,

PAUL and VIRGINIA. By ST. PIERRE. With an Original Life of the Author, by Saint Beuve, and illustrated by upwards of Three Hundred and Thirty magnificent Engravings on Wood, drawn by Johannot, Français, and Meissonnier, and engraved by the first Artists of France and England.

In medium 8vo. price 16*s.* cloth lettered,

PICTURES of the FRENCH; a Series of Literary and Graphic Delineations of French Character. By Jules Janin, Balzac, Cormenin, and other celebrated French Authors. The Drawings by Gavarni, H. Monnier, and Meissonnier.

"Not only are the designs exquisite as works of art, but inimitably characteristic."—*United Service Gazette.*

In 8vo. price 12*s.* bound in cloth, lettered,

CONFESSIONS of HARRY LORREQUER, late Captain in the —— Regiment of Foot. With Twenty-two Illustrations by "Phiz."

Also, by the same Author,

CHARLES O'MALLEY, THE IRISH DRAGOON: in Monthly Parts, illustrated by "Phiz," price 1*s.* Number I. to VII. now ready.

ATLASES.

DOWER'S GENERAL ATLAS of MODERN GEOGRAPHY, containing Fifty-one Maps, from the latest and best authorities. Price One Guinea coloured; and 16*s.* plain; half-bound. With a copious consulting Index.

DOWER'S SCHOOL ATLAS of MODERN GEOGRAPHY, containing Thirty-six Maps and a copious consulting Index. Price 12*s.* coloured, half-bound.

DOWER'S MINOR SCHOOL ATLAS, containing Twenty-one Maps, compiled from the best Authorities, and embracing the latest Discoveries. With an Index. Price 7*s.* 6*d.* half-bound.

DOWER'S SHORT ATLAS, containing Twelve Maps, for the Use of Younger Pupils, with a copious consulting Index. Price 5*s.* coloured, and 4*s.* plain.

*** Each of these Atlases contains one-third more Maps, each Map containing much more information than is to found in any others at the same price.

In imp. 4to. price Two Guineas, half-bound in russia,

A GENERAL DESCRIPTIVE ATLAS of the EARTH, containing Fifty-one Maps, engraved in the best style of the Art, and from the best Authorities; each Map accompanied by two pages of letter-press, descriptive of the Physical features, Natural Productions, and General Statistics of the country. By W. M. HIGGINS, F.G.S.

WORKS ON GARDENING AND BOTANY.

In 6 vols. super-royal 8vo. price 7*l.* 10*s.* Containing Two Hundred and Ninety Plates of rare, beautiful, or curious Plants, carefully drawn and coloured from Nature,

PAXTON'S MAGAZINE of BOTANY, and REGISTER of FLOWERING PLANTS. The text comprises botanical descriptions of the Plants figured; the Time of their Introduction; the best Mode of Culture; and every other particular essential to their perfect growth. Every beautiful plant, newly introduced, if considered worthy of notice and general cultivation, is described, and, if of sufficient importance, accurately figured.

In small 8vo. price 10*s.* 6*d.* cloth lettered,

THE FLOWER-GARDEN: its Cultivation and General Arrangement: with Select Lists of the most desirable Annual, Biennial, and Perennial Flowering Plants, carefully arranged according to their Height, Colour, and Time of Flowering. With Hints on the most approved Mode of laying out and arranging the Ground. Illustrated by Twelve elegantly coloured Groups of Flowers, and Eight Views and Plans of Gardens.

In small 8vo. price 10*s.* 6*d.* cloth, gilt edges,

THE GREENHOUSE, HOTHOUSE, and STOVE: containing Directions for the Cultivation of every Species of Exotic Flowering Plants, from the Author's Daily Practice; the Erection, Management of the Hothouse, and best Mode of Warming. By CHARLES M'INTOSH, T.C.H.S. Illustrated by Eighteen Groups of Flowers, coloured after Nature, and numerous Illustrations on Wood.

A New Edition, in small 8vo. price 10*s.* 6*d.* cloth, gilt edges,

THE ORCHARD and FRUIT-GARDEN; including the Management of all Wall, Standard, and Espalier Fruit Trees, and the Forcing-pit, from the Author's Daily Practice. With Select Lists of the Varieties worth cultivating, including their Synonymes. By CHARLES M'INTOSH, T.C.H.S. Illustrated by Eighteen Groups of the most choice Fruits, coloured after Nature, and numerous Engravings on Wood.

In a neat Pocket Volume, price 2*s.* cloth, lettered and gilt,

EVERY LADY HER OWN FLOWER-GARDENER. Intended for the Industrious and Economical only. By LOUISA JOHNSON. A 3rd edition, much improved.

In 10 vols. super-royal 8vo. PRICE REDUCED TO 6*l.* 6*s.* cloth lettered, and 7*l.* 10*s.* half-bound morocco,

THE BRITISH CYCLOPÆDIA

OF THE

ARTS, SCIENCES, LITERATURE, GEOGRAPHY, NATURAL HISTORY, AND BIOGRAPHY.

THE FIRST DIVISION contains Treatises in every branch of Natural, Experimental, and Mechanical Philosophy; Anatomy, Medicine, Chemistry, and the Fine Arts and Manufactures. In 2 large 8vo. vols. with about 600 Woodcuts and 50 Plates of Machinery, engraved on steel, price 1*l.* 16*s.* cloth lettered, and 1*l.* 14*s.* half-bound morocco.

THE SECOND DIVISION contains a Description of the Surface of the Globe, the Progress of Geographical Discovery, an Historical Epitome of the most remarkable Productions; an Historical and Political Sketch of each Kingdom, of the Ancient and Modern Social Systems, and the Legal Forms which have arisen out of them. In 3 large 8vo. vols. upwards of 1600 Vignettes of Scenery, Costumes, or Monuments, on wood, and 63 Maps of Countries and Plans of Cities, forming a complete History of the Universe—Political, Historical, Literary, and Geographical, adapted either for reading or reference. Price 4*l.* 5*s.* cloth lettered, or 3*l.* 5*s.* half-bound morocco.

THE THIRD DIVISION stands alone among British publications; there not being another in the language in which the productions of nature are treated of at such length in their general relations, and at the same time in their particular details. It is also *wholly original*, except in the passages which are avowedly quoted; and thus not only the general scope, but all the details, are brought up to the present state of science, and illustrated by many Woodcuts and Etchings by Landseer. In 3 vols. 2*l.* 5*s.* plain, and 3*l.* 3*s.* coloured; and 2*l.* 10*s.* and 3*l.* 8*s.* half-bound morocco.

THE FOURTH DIVISION forms a complete Encyclopædia of Biography. The Lives have been written with the utmost care, those points being dwelt upon which illustrate, in the most prominent manner, the character of the individual under consideration, and much original matter has been added to the British portion of the work. The Illustrations consist of Portraits engraved on wood, from the drawings of Mr. Thomas Landseer; the Residences, Monuments, and fac-similes of the Autographs of celebrated characters. In 2 vols. each containing upwards of 1000 pages, price 30*s.* cloth boards, and 34*s.* half-bound morocco.

CUVIER'S ANIMAL KINGDOM.

In 1 thick vol. royal 8vo. price, cloth lettered, 24*s.* with 25 Plates by Mr. LANDSEER,

THE ANIMAL KINGDOM, ARRANGED ACCORDING TO ITS ORGANIZATION.

By the Baron CUVIER,

Member of the French Academy, and the Royal Societies of London, Berlin, Petersburgh, &c.

Translated and slightly abridged from the latest French Edition, and brought down to the present state of Science.

THE MAMMALIA, BIRDS, and REPTILES. By EDWARD BLYTH, author of various Papers on Natural History in The Analyst and Magazine of Natural History.

THE FISHES. By ROBERT MUDIE, author of 'The British Naturalist,' 'Natural History of Birds,' and the articles on Zoology in the British Cyclopædia.

THE MOLLUSCA. By GEO. JOHNSTON, M.D. author of 'A History of British Zoophytes,' Fell. Roy. Coll. of Surgeons, and Mem. of the Royal Med. Society of Edinburgh.

THE CRUSTACEA and INSECTS. By J. O. WESTWOOD, F.L.S., author of 'The Entomologist's Text-Book,' &c. to the Ent. Soc. London, Hon. Mem. Soc. Nat. Hist. Quebec, Moscow, Lund, Lille, Mauritius, Ent. Soc. Paris, &c.

In small 8vo. price 5*s.* 6*d.* cloth lettered,

THE NATURAL HISTORY and ANTIQUITIES of SELBORNE. By the Rev. GILBERT WHITE, A.M.; with Notes by Edward Blyth; a map of the locality beautifully engraved on steel, by Dower, copiously illustrated with highly-finished Engravings of Animals and Scenery on wood; with a very interesting account of the present state of the locality, written during a visit to Selborne in the Summer of 1836, by Mr. Mudie.

In imp. 8vo. in handsome binding, price 16*s.*

GLEANINGS of NATURE; containing Fifty-seven Etchings of Animals, coloured Groups of Flowering Plants, with popular descriptions of their Habits. By ROBERT MUDIE.

In foolscap 8vo. price 7*s.* plain, and 8*s.* 6*d.* with Plates coloured,

THE ENTOMOLOGIST'S TEXT-BOOK: a Guide to the Natural History, Habits, and Classification of Insects. By J. O. WESTWOOD, F.L.S.

In 4 vols. royal 18mo. price 5*s.* each, cloth lettered,

MAN IN HIS PHYSICAL, INTELLECTUAL, and SOCIAL STATE. By ROBERT MUDIE.

*** These four volumes are continuous, but each is complete in itself.

In small 8vo. price 6*s.* 6*d.* cloth lettered,

LETTERS on the NATURAL HISTORY of the INSECTS mentioned in SHAKSPEARE'S PLAYS. By ROBERT PATTERSON, Esq., Belfast.

ORR & CO.'S CABINET EDITIONS,

WITH ELEGANT ENGRAVED TITLES AND FRONTISPIECES.

THE SEASONS, AND CASTLE OF INDOLENCE.
By JAMES THOMSON.
With a beautiful Portrait of the Author, and the View from Richmond Hill, engraved on steel.
Price 2*s.* cloth, gilt edges; 3*s.* silk; and 5*s.* morocco.

THE SHIPWRECK, AND OTHER POEMS.
By WILLIAM FALCONER, a Sailor.
Embellished with Wood Engravings by T. Landseer.
Price 2*s.* cloth, gilt edges; 3*s.* silk; and 5*s.* morocco.

THE POETICAL WORKS of HENRY KIRKE WHITE.
With a beautiful Portrait of the Author, from Chantrey's bas-relief, and a Landscape frontispiece.
Price 2*s.* cloth, gilt edges; 3*s.* silk; and 5*s.* morocco.

MILTON'S PARADISE LOST, AND OTHER POEMS.
In 2 vols. with Vignette Titles and Frontispieces.
Price 4*s.* cloth, gilt edges; 6*s.* silk; and 10*s.* morocco.

SCOTT'S LADY OF THE LAKE.
With a Portrait and View of Loch Katrine.
Price 2*s.* cloth, gilt edges; 3*s.* silk; and 5*s.* morocco.

SCOTT'S MARMION.
With a Vignette Title and Frontispiece.
Price 2*s.* 6*d.* cloth gilt; 3*s.* 6*d.* silk; and 5*s.* 6*d.* morocco.

SCOTT'S LAY OF THE LAST MINSTREL, AND OTHER POEMS.
With Vignette Title and Frontispiece.
Price 2*s.* cloth, gilt edges; 3*s.* silk; and 5*s.* morocco.

13, *Great Marlborough Street, Oct.* 17.

MR. COLBURN'S NEW PUBLICATIONS.

I.

THE HISTORY OF A FLIRT,

RELATED BY HERSELF.

3 vols. post 8vo.

"A capital novel."—*Weekly Chronicle.*

"An admirable novel—a portraiture of 'life, character, and behaviour,'—a sort of Daguerreotype reflection of society, its modes, manners, successes, and disappointments."—*Dispatch.*

"Displays a profound knowledge of the human heart, the secret recesses and workings of which it probes and lays bare with a master-hand."—*Courier.*

II.

SCENES AND SPORTS IN FOREIGN LANDS.

By MAJOR E. NAPIER, 46th Regt.

2 vols. small 8vo. illustrated with a Series of Drawings taken from Nature, 21*s.* bound. (Just ready.)

"Seriously, that same *shooting* is a most barbarous amusement, only fit for *majors* in the army, and royal dukes, and that sort of people; the mere walking is bad enough, but embarrassing one's arms, moreover, with a gun, and one's legs with turnip tops—exposing oneself to the mercy of bad shots and the atrocity of good—seems to me only a state of painful fatigue, enlivened by the probability of being killed."—*Sir E. L. Bulwer's 'Pelham.'*

III.

THE SIEGE OF FLORENCE.

AN HISTORICAL ROMANCE.

3 vols. post 8vo. (Just ready.)

IV.

NARRATIVE OF THE WAR IN AFFGHANISTAN.

By CAPT. HENRY HAVELOCK,

Aide-de-Camp to Major-General Sir Willoughby Cotton, G.C.B. and K.C.H., commanding the Bengal Forces.

In 2 vols. post 8vo. price 21*s.* bound, with a complete Map of the Seat of War.

"This work furnishes by far the most comprehensive as well as the most interesting account the public has yet received of the late brilliant war in Affghanistan. Capt. Havelock's position was peculiarly favourable for the production of a narrative of the events of the campaign; and his work is highly creditable to his spirit of observation, his impartiality, and his desire and determination to tell the exact truth on all points."—*New Monthly.*

V.

THE NAVAL SURGEON.

By the Author of 'Cavendish,' 'The Flying Dutchman,' &c. 3 vols. (Just ready.)

VI.

THE DREAM, AND OTHER POEMS.

By the HON. MRS. NORTON.

1 vol. 8vo. with fine Portrait of the Author, after a Drawing by E. Landseer, R.A., 12*s.* bound.

"A very beautiful poem. This lady 'is the Byron of our modern Poetesses,'—she has very much of that intense personal passion by which Byron's poetry is distinguished from the larger grasp and deeper communion with man and nature of Wordsworth. She has also Byron's beautiful intervals of tenderness, his strong practical thought, and his forcible expression. It is not an artificial imitation, but a natural parallel; and 'we may add that it is this,' her latest production, which especially induces, and seems to us to justify our criticism."—*Quarterly Review.*

VII.

A YEAR AMONG THE CIRCASSIANS.

By J. A. LONGWORTH, Esq.

In 2 vols. post 8vo. with Illustrations, 21*s.* bound.

"Incomparably the most valuable account of Circassia that has appeared."—*Court Journal.*

"This account of Mr. Longworth's residence in Circassia will deeply interest our readers. Whether perused merely in a view to amusement, or studied as to the duties which England has to discharge in the East,—in whatever aspect it is contemplated, Mr. Longworth's truly graphic sketch cannot fail to reward the reader's attention."—*Post.*

VIII.

AGNES STRICKLAND'S

LIVES OF THE QUEENS OF ENGLAND.

VOL. III., price 8*s.* 6*d.* bound, with Illustrations.

"These volumes have the fascination of a romance, united to the integrity of history."—*Times.*

"A most valuable and entertaining work."—*Chronicle.*

"A charming work, full of interest, at once serious and pleasing."—*M. Guizot.*

IX.

THE CASHMERE SHAWL.

By CAPT. WHITE,

Author of 'The King's Page,' 'Almack's Revisited,' &c. 3 vols.

"The best of Mr. White's productions."—*John Bull.*

"Full of talent, variety, and entertainment."—*New Monthly.*

"We welcome the re-appearance of this highly-gifted author in the literary ranks. We predict a great success for this 'Cashmere Shawl'—the ladies especially should envelope their minds for some few hours with this visionary and magnificent article of gorgeous adornment. In these volumes the reader will find a variety as charming as it is abundant; he will be reminded by their humour of Rabelais, and by their poetry of Thomas Moore, with a troop of Peris in his imagination."—*Metropolitan.*

X.

THE ART OF NEEDLEWORK,

FROM THE EARLIEST AGES,

With Notices of the Ancient Historical Tapestries.

Edited by the Right Honourable the COUNTESS of WILTON.

Dedicated, by permission, to Her Most Gracious Majesty the Queen Dowager.

In 1 vol. post 8vo. 10*s.* 6*d.* bound.

"An admirable volume, which should be possessed by every lady."—*Times.*

XI.

HISTORY OF THE BRITISH TURF,

FROM THE EARLIEST PERIOD TO THE PRESENT DAY,

Comprising every particular, technical and otherwise, to which the Lover of Racing may desire to refer, either as a matter of business or amusement.

By JAMES CHRISTIE WHYTE, Esq.

In 2 large vols. 8vo. with Illustrations, 28*s.* bound.

"This work must become a standing authority on the subject of horses and horse racing and no one at all interested in such subjects will be without it; whilst the general reader will be delighted with it for the pleasant spirit in which it is written, and the singular traits of extraordinary character with which it is so profusely studded."—*Argus.*

XII.

ITALY AND THE ITALIANS.

By F. VON RAUMER,

Author of 'England in 1835,' 'Illustrations of History,' &c.

2 vols. post 8vo. 21*s.* bound.

"By far the best and most entertaining book on Italy that has been published in our own day."—*New Monthly.*

"The contents of this attractive book are multifarious, and put together in a familiar and agreeable spirit. It forms a most pleasant, varied, and interesting work upon Italy *as she is.*"—*Atlas.*

HENRY COLBURN, Publisher, 13, Great Marlborough-street.

ORDERS RECEIVED BY ALL BOOKSELLERS.

London: JAMES HOLMES, 4, Took's Court, Chancery Lane. Published every Saturday, at the ATHENÆUM OFFICE, 14, Wellington-street North, Strand, by JOHN FRANCIS; and sold by all Booksellers and Newsvenders.—Agents: for SCOTLAND, Messrs. Bell & Bradfute, Edinburgh; and D. Campbell, Glasgow;—for IRELAND, J. Cumming, Dublin.